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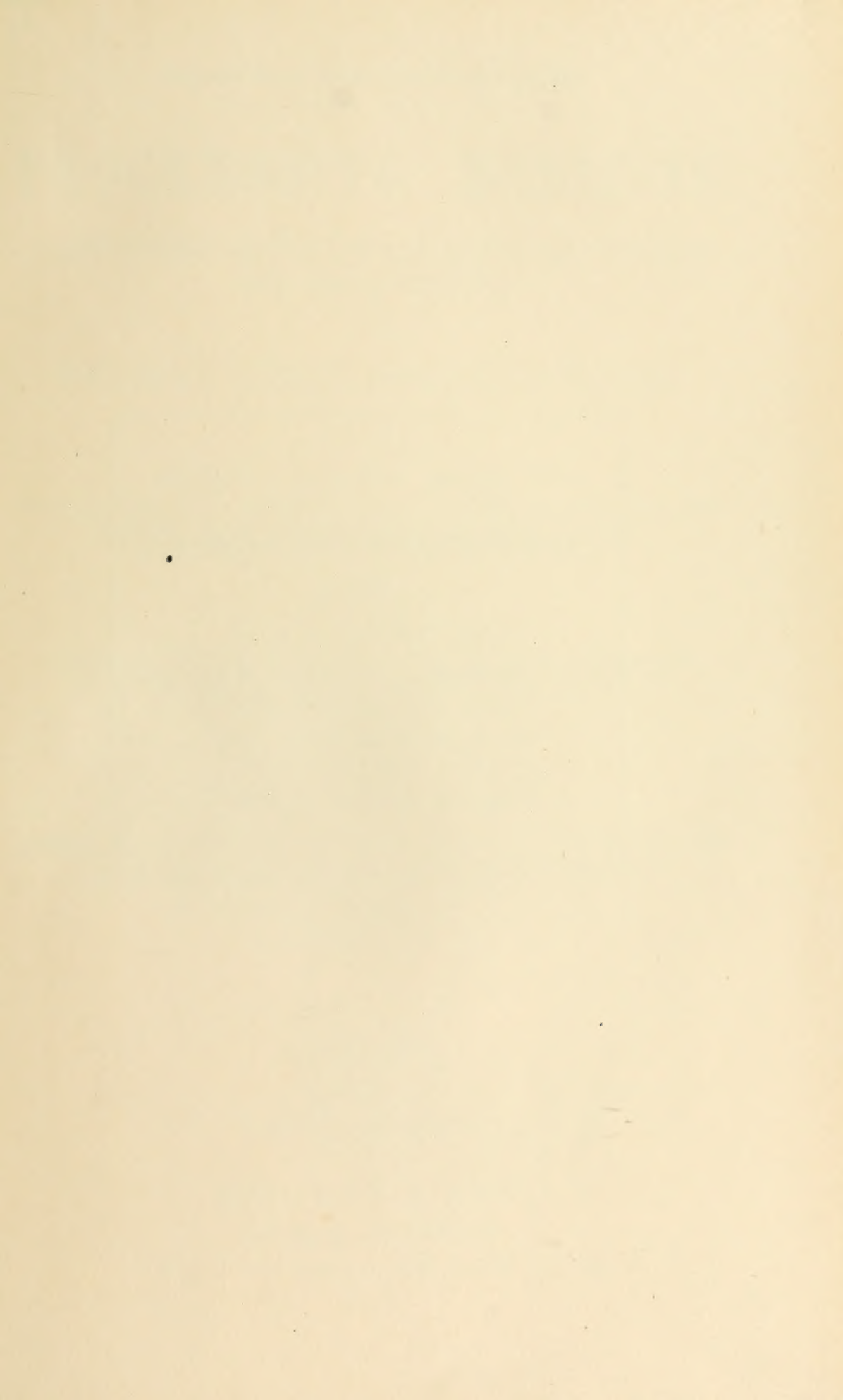














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# PROGRESSIVE MEDICINE

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES  
AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES

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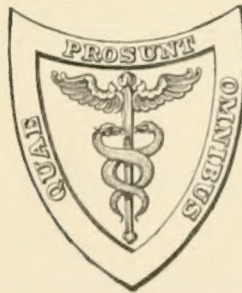
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VOLUME I. MARCH, 1909

SURGERY OF THE HEAD, NECK AND THORAX—INFECTIOUS DISEASES, INCLUDING  
ACUTE RHEUMATISM, INFLUENZA AND CROUPOUS PNEUMONIA—  
THE DISEASES OF CHILDREN—RHINOLOGY AND  
LARYNGOLOGY—OTOLOGY



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# PROGRESSIVE MEDICINE.

MARCH, 1909.

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## SURGERY OF THE HEAD, NECK AND THORAX.

BY CHARLES H. FRAZIER, M.D.

### THE BRAIN.

**Cerebral Trauma.** In our aspect of the various traumatic lesions of the brain from the standpoint of surgical therapy, we have abandoned the old classification of concussion, compression, and hemorrhage. Generally speaking, the cases requiring surgical intervention may be divided into two classes: (1) Those with a local lesion and focal symptoms, such as may arise from depressed fragments or hemorrhage, and (2) those without focal symptoms but presenting a clinical picture which we have come to recognize as the expression of increased intracranial tension. This increased intracranial tension may be brought about by a hemorrhage, epidural or subdural, but quite as, if not more, frequently by a generalized cerebral edema, which follows contusion and laceration. The symptomatology of the latter condition has been discussed in previous numbers of PROGRESSIVE MEDICINE. Suffice it to say that a comprehensive understanding of the subject involves a knowledge of the alterations of the circulation of the brain as influenced by the encroachment of the boggy brain upon its vascular channels, veins, and arteries. The earliest stage is the stage of slight venous congestion, the stage of headache and irritability; the second is the stage of deeper congestion alternating with cerebral anemia, the stage of coma and of general relaxation, of slow, full-bounding pulse and of high blood pressure, of the stertorous breathing, of the dilated pupil, and rarely of changes in the disk. If an increase in the blood pressure is sufficient to overcome or compensate for the effects of this increased tension, the patient will, in all likelihood, recover. If, however, the heart action is unable to cope with the increasing obstruction offered to the cerebral circulation, a condition of anemia of the vital centres supervenes, which, if unrelieved, will prove fatal. The final stage is marked by rapid failure



of the cardiac and respiratory functions and death. While this is a very imperfect and incomplete presentation of this most important subject, it will serve to suggest to the reader the general principles underlying the indications for interference in cases of intracranial trauma.

In discussing the question of operation for intracranial trauma cases, Hartwell<sup>1</sup> classifies them as follows: (1) Those in which the injury is so slight that recovery is certain without operation; (2) those in which the severity of the injury is so great that death is unavoidable in a short time; (3) those in which the injuries are of such a nature that operation is positively indicated; and (4) those in which the indications for and against operation are more or less evenly balanced, borderline cases.

The article is devoted especially to the third and fourth classes. The third he further subdivides into those in which the injury is due to direct damage of the brain, as by a depressed fracture, and those in which the lesion is an epidural or subdural hemorrhage. These conditions are both easily recognized and the indications for operation perfectly clear. The fourth class, or the borderline cases, are those in which, as a rule, no localizing diagnosis can be made. In studying each individual case the diagnostic data may be grouped as follows: (1) Those of the functional disturbance as a whole; (2) those of the actual damage of the brain tissue over localized areas. In this group are the sensorimotor disturbances; (3) those of the derangement of function due to lesions outside the brain, such as a fracture of the vertex or base; and (4) manifestations of injury shown in organs other than the sensorimotor system. In this group there are four findings of diagnostic value: (1) Those resulting from lumbar puncture; (2) protrusion of the eyeball; (3) choked disk; and (4) changes of the circulation due to interference with the medullary centres. Blood in the spinal fluid suggests serious damage to the brain with ventricular or subdural hemorrhage. Hemorrhage into the brain tissue does not give it; fracture of the base usually does. Protrusion of the eyeball and choked disk usually show increased intracranial tension. The characteristic changes in the circulation and respiration are equally important.

In the fourth and last group of cases, in which the essential lesion is a cerebral edema, the result of intracranial tension, the decompressive operation should be practised, not, I believe, routinely, but in carefully selected cases. It is not a very difficult matter to one who studies each case thoroughly and understands the pathology of the condition with which he is dealing, together with its clinical manifestations, to decide when operation seems imperative to save life. Indiscriminate operation, even in all apparently serious cases, should be depreciated.

In this connection, reference might be made to some recent remarks by Cushing<sup>2</sup> apropos of the *treatment of basal fractures*, in which he states

<sup>1</sup> *Annals of Surgery*, July, 1908.

<sup>2</sup> *Johns Hopkins Hospital Bulletin*, February, 1908.

that during the past year he has performed the decompressive operation *almost invariably* after fracture of the base of the skull because nearly all the symptoms are due to intracranial pressure.

I doubt very much whether surgeons generally will subscribe to Cushing's recommendation to operate invariably for basal fractures. Whether decompression will do away with post-traumatic neuroses is still only a matter of conjecture. According to Cushing most neurologists hold to this view. In times past a great many cases of basal fracture died as a result of secondary infection and meningitis. In our modern management of these cases this factor has been eliminated, so that the fatalities are due largely to the injury to the brain structure, to the resulting hemorrhage and edema. In some cases the damage has been so great that, no matter whether or not decompression is practised, the patients die. The fatal tendencies of these cases, I think, as a rule, are recognized easily, and, as a rule, they survive the injury but a short time. The symptoms develop rapidly and death ensues often within a few hours. In other cases the cerebral edema develops more gradually, and one is able by careful observation and repeated examination to decide when it is proper to interfere. That a considerable number of cases recover without surgical intervention, in which there is evidence of basal fracture, is borne out by the experience of every surgeon with a large experience in accident work. When, however, there is reason to believe that the circulation is not able to cope with the situation, decompression should be practised.

**SUBDURAL FRONTOBASAL HEMORRHAGE.** Based upon his observation of two cases, one recognized only at necropsy and the other in course of an operation, Paul<sup>1</sup> suggests this subdivision in the classification of intracranial hemorrhages. In the first of the two cases above referred to an exploratory operation was performed at the site of the injury, but with negative results. When the patient died, thirty-six hours later, a large blood clot was found beneath the frontal lobes on the side opposite that of the injury, the patient having been hit over the malar bone. The development in this case of some motor symptoms was certainly misleading, and in the light of the condition found at the autopsy the motor disturbances were attributed to the pressure of the cortex against the skull due to the accumulation of blood upon the opposite side. The principal symptom, as in the second case, was severe frontal headache. In falling, the second patient struck the left occiput against some staging. Seventy-two hours after the accident, apart from some listlessness and a slow pulse, there were no suggestive symptoms except intense frontal headache. The observer seemed to see in this case certain features which were observed in that above alluded to, and the surgeon, Dr. Brewster, was asked to explore the base of the skull beneath the frontal lobe, and there found a large subdural clot.

<sup>1</sup> Boston Medical and Surgical Journal, May 28, 1908.



Just why these basal hemorrhages should limit themselves to the frontal region is not very easily explained. That they should originate frequently in this region is due to the fact that the frontal lobes are more exposed to injury, since they are not protected, as are the lobes in the middle and posterior fossæ, by the basal cysternæ. With the exception of the tip of the temporal lobes, probably no other portion of the brain is so exposed to injury as the frontal lobes. In considering the diagnosis, one should take into consideration the influence of contrecoup in producing a lesion diagonally opposite that upon which the blow was inflicted; thus, in the second of the above series the blow was inflicted on the occipital region of one side and the hemorrhage was found in the frontal region of the other.

While these are both interesting cases, it is not entirely clear to me upon what grounds the author justifies the classification of his subdural frontobasal hemorrhage. One often sees frontal headache when the clot is situated in other regions. Thus, for example, I have seen a patient with a very large clot in the occipital region with symptoms similar to those of Paul's cases. In other words, the absence of sensorimotor disturbance plus headache and signs of increased intracranial tension do not point of necessity to a hemorrhage at the base of the frontal lobes.

**INTRACRANIAL HEMORRHAGE OF THE NEWBORN.** Under certain circumstances, concerning which we will speak later, surgeons are justified in resorting to operation for the relief of this condition. As this is a condition which few surgeons may have seen, it may not be amiss here to outline the clinical picture presented by these cases. This picture differs somewhat according to whether the hemorrhage is subtentorial or pretentorial.

In *subtentorial hemorrhages* the children are frequently born more or less asphyxiated, but they cry lustily and often give the impression at first of being perfectly healthy children, not infrequently taking the breast. In contradistinction to cases of pretentorial hemorrhage, they are, as a rule, comparatively quiet, but after the course of several hours one sees signs of disturbance of the medulla: an irregular, weak respiration, followed occasionally by pronounced convulsive seizures with deep cyanosis. The skin meanwhile becomes bluish yellow and the fontanelles extremely tense; the whole clinical picture suggests atelectasis of the lungs; the respiratory disturbance becomes more aggravated, and inside of twenty-four to forty-eight hours the patient dies. If the patient should survive this period, there may be sometimes focal symptoms due to hemorrhage of the cerebral hemispheres, and in some instances the blood may descend into the spinal canal, where it may cause signs of spinal irritation.

In *pretentorial hemorrhages* the conditions are very different, and the picture varies accordingly. In these cases the lesion is usually unilateral,

no blood-staining fluid will be recovered on lumbar puncture, and in bulk the hemorrhage is very much larger, resulting from rupture of the veins emptying into the longitudinal sinus. The first day after the child is born nothing unusual may be observed; on the second day one sees usually signs of extreme restlessness, but what is of still greater diagnostic importance, the child cries and screams almost ceaselessly and for no apparent reason. This inexplicable screaming is pathognomonic, and due probably to tension of the dura. Gradually signs of increasing intracranial tension appear; the respiratory disturbances, loss of consciousness, elevation of blood pressure, occasionally slowing of the pulse, together with symptoms of local compression, as, for example, contralateral paralysis. If unrelieved, the intracranial tension will gradually increase, partly as a result of the cerebral edema, and the child dies between the fourth and the eighth day from respiratory failure.

A year ago<sup>1</sup> Seitz collected some 19 cases. In a more recent contribution<sup>2</sup> he sums up his accumulated experience in a total of 23 cases. In studying the fatal cases, of which there were 18, he found that, without exception, the hemorrhage was subdural, *i. e.*, between the dura and pia, almost never in the brain substance, and seldom in the ventricles. The subtentorial hemorrhages proved fatal in every instance, although there may be only a teaspoonful of blood, but quite enough in this location to cause fatal symptoms by pressure on the medulla.

If any conclusions as to the etiology are to be drawn from his series of 23 cases, it is, that the general conception that most cases are due to forceps pressure is unfounded. At least one-fourth of the twenty-three were uncomplicated spontaneous deliveries.

As to the indications for operation: In every case with well-marked progressive brain pressure an attempt should be made to save the child by operation. The only case of the eighteen fatal cases subjected to operation died because the hemorrhage was both pretentorial and subtentorial, and the latter was not recognized. Of the 5 recoveries, in 2 there was evidence of only local compression, and all recovered completely, that is, without any psychic or nervous sequels. Whenever the symptoms point to the lesion being purely focal Seitz believes the child should be let alone, but just as soon as there are signs of general increase in intracranial tension we should operate without delay. In the subtentorial cases lumbar puncture is followed only by transitory improvement, but a formidable operation would almost invariably prove fatal.

**Hyperalgesia after Cranial Injury.** I had occasion to review this subject a year ago in an article by Vorshutz.<sup>3</sup> A recent article by Clairmount<sup>4</sup> contains a report in tabulated form of 23 cases, 11 due to gunshot wounds,

<sup>1</sup> PROGRESSIVE MEDICINE, March, 1908, p. 47.

<sup>2</sup> Münch. klin. Woch., March 24, 1908.

<sup>3</sup> PROGRESSIVE MEDICINE, March, 1908, p. 41.

<sup>4</sup> Mitt. a. d. Grenz. der Med. u. Chir., 1908, xix, i.



6 following basal fracture with concussion, and 6 following concussion alone. Apart from the detailed reports there is nothing in this article that was not covered by Vorshutz.

**Cranial Defects in Epilepsy.** In connection with a report of several cases illustrating the different indications for operations on the brain, Gobiet<sup>1</sup> brings up the old question of the relation of cranial defects to epilepsy; for example, he recalls Stieda's report of a series of thirty-three cases in which very favorable results were obtained by closing the defect, contrary to Kocher's theory. The latter, as we know, advocates decompressive operations for all cases of epilepsy, and, therefore, is not an advocate of closure of such cranial defects as may result from trauma. Gobiet is inclined to believe that no hard and fast rule can be laid down for all cases, that there are certain cases in which Kocher's method may be of service, particularly in gross lesions such as thickening of the dura or skull, and again others in which the best results seem to be obtained by closing the preëxisting defects. He reports more or less in detail two cases illustrating these two types. There is no question, and this statement seems to be indorsed by no less authority than Friedreich, that Kocher's method has been followed by absolute recovery, even in severe types of epilepsy and not even of the Jacksonian type. Friedreich, however, in discussing the rationale of the Kocher method, attaches no weight whatsoever to the relief of pressure afforded by the operation. For example, in some cases that have entirely recovered from the attacks after decompression even when the defect may be completely ossified.

It has been said that bulging of the brain through the opening suggests increased intracranial pressure, but the latter is probably not the result, but the cause, of epilepsy, and is due to the interference of the return of venous circulation afforded by the contracted muscles in the neck. In only 1 of a series of 8 cases that Friedreich had under observation, 2 of which were entirely cured and the remainder improved, was any bulging noticed. He has given up entirely any attempts to advance any theory to account for the improvement which follows the so-called "ventilbildung."

The great majority of surgeons, as Sohr<sup>2</sup> says, are in favor of immediate repair of cranial defects, partly because it protects the brain from direct injury at the site of the opening, more especially because it tends to prevent the subsequent development of epilepsy. After reviewing the history of the elaboration of the present technique, Sohr reports 7 cases, in which he used the Garré method with uniformly good results. The advantages of the Garré over other methods are: (1) That by reflecting the scalp and laying bare the periosteum one secures a perfect exposure of the field of operation; (2) that it simplifies the fashioning

<sup>1</sup> Wiener klin. Woch., 1908, No. 21.

<sup>2</sup> Beiträge zur klin. Chir., Band lv, Heft 2.

of the flap which exactly fits the defect to be repaired; (3) that in sliding sideways the periosteal osseous flap the danger of necrosis is excluded; (4) that the method insures perfect bony closure of the defect; (5) the cosmetic results are most satisfactory. But one serious objection might be made to the method; namely, the danger of hemorrhage from the diploë. Eiselsberg lost one patient from hemorrhage. To control free bleeding Garré suggests that a small piece of bone be chipped off and hammered into the diploic sinus.

In closing a cranial defect large enough to insert the greater part of the closed fist, Eiselsberg<sup>1</sup> used an aluminum plate of his own design. The plate had a number of arms, each cut off at different lengths so as to fit the irregular defect. The ends of the arms were split longitudinally for a short distance, one part of the arm resting on the outer surface of the skull, along the edge of the defect, the other resting against the cut edge of the skull along the margins of the defect. The plate itself is bent to conform to the general shape of the skull and secured in place with catgut sutures, each one attaching an arm to the periosteum. The more pressure put upon the arch from the outside, the firmer and stronger it becomes. The plate is easily made, easily inserted, and can be bent into any desired shape.

**Brain Tumors.** The surgery of brain tumors has in recent years passed through a stage of revival and of development. The technique of operations for the exposure of suspected regions has reached well nigh a stage of perfection; methods of diagnosis have become so much more accurate that the percentage of cases in which the tumors have been found at operation is on the increase; the indications for the radical and palliative operation are now sharply defined; the risks of operation have been reduced to a minimum; we are now in a position to tell the patient and physician the chances of permanent or temporary relief and the expectation of life. With the experience that comes from repeated observation we are better able to judge of the operability or inoperability of tumors, whether to attempt to extirpate the growth or to be content with the palliative effects of decompression.

This subject has been threshed out by the neurologists on the one hand and the surgeons on the other, and together they have come to the conclusion that even before the diagnosis has been made, when the tumor cannot be accurately localized, it is no longer justifiable to postpone operation until the tumor has become inoperable or the patient blind. In other words, surgical therapy has become a recognized procedure in the management of tumors of the brain; the propriety of surgical intervention is no longer questioned.

The dearth of surgical literature upon the subject during the past year may be taken as evidence that most of the problems have been solved.

<sup>1</sup> *Annals of Surgery*, December, 1908.



At the meeting of the last American Medical Association one whole day was given up to the subject, a morning session of the Surgical Section to lantern slide demonstrations of cranial technique, and an afternoon session of the combined nervous and ophthalmic sections to a discussion of the effect of decompressive operations upon choked disk or papillo-edema. The contributions of de Schweinitz to this meeting and to the January, 1909, issue of the *University of Pennsylvania Medical Bulletin* are the most important and instructive that have come to my notice in years. While the surgeon should be familiar with the relation of choked disk to intracranial lesions, tumors, abscesses, and the effects of trauma, a discussion of this subject is not within the scope of a chapter devoted to surgery.

The question as to how far one should venture to explore the brain in subcortical tumors is a difficult one to deal with dogmatically. So many circumstances must be taken into consideration, as the condition of the patient, the experience of the operator, the positiveness of the diagnosis, the nature of the tumor; these factors and a multitude of less important ones. That a deep-seated tumor may be found by palpation and removed is illustrated by a case operated upon by Adler.<sup>1</sup> The tumor was believed to be in the motor region, but not finding it upon the surface, he inserted his index finger in between the precentral and postcentral convolutions to a depth of 4 cm. Here he was able to detect the presence of a tumor and to shell it out, as in this case it happened to be an encapsulated growth.

I doubt very much whether this is a procedure which should be indorsed or generally practised. In most instances the deep-seated growths are of the infiltrating character, and even though one should be able to detect it by palpation it would be difficult or even impossible to remove it. Certainly in none but experienced hands and when there is no question of doubt as to localization should this practice of digital exploration for deep-seated tumors be considered justifiable.

Among the successfully localized and extirpated tumors was an endothelioma originating probably in the Pacchionian bodies. The operation by Tschudy<sup>2</sup> was performed in two stages because the patient's condition after the tumor was exposed did not justify any prolongation of the operation. At the second stage a tumor weighing 86 grams was removed without difficulty. The patient recovered from the operation and regained the power of speech and the use of his arm and leg. In Graves'<sup>3</sup> case, while the operation was most successful, it was not attended with any features of special interest to the surgeon, except that a cortical cyst was found, its contents evacuated, and a portion of the wall excised.

<sup>1</sup> Berl. klin. Woch., No. 19, 1908, p. 936.

<sup>2</sup> Corr. f. Schweiz. Aerzte, 1908, No. 11.

<sup>3</sup> Medical Record, May 23, 1908.

Verco<sup>1</sup> removed a fibrocartilaginous *tumor of the dura mater* weighing 238 grains. The patient had had several definite convulsive attacks in 1904 and 1905, and for months there had been a history of headache and vomiting; there was a double optic neuritis. The preliminary operation was performed on March 6, exposing a dull white tumor attached to the dura and the falx. This tumor was removed two weeks later. After the operation the patient became hemiplegic, and at the time of the report the optic neuritis was disappearing, although the patient had not recovered her vision.

The same author evacuated a *hydatid cyst in the region of the Rolandic fissure*. The patient was a boy, aged fourteen years, with partial paralysis of the right side, of three months' duration, associated with frontal headache, occasional vomiting, failure of memory, and diplopia. There was definite asymmetry of the skull, the left frontoparietal region being very prominent; sensation was dulled on the left side of the face, with slight paresis; there was alternating internal non-paralytic strabismus with diplopia and double optic neuritis. Much weakness of the right arm and leg was found. The patient survived the operation only eight days, and at the autopsy other cysts were found in the frontal region, in the right cerebellar hemisphere, and in the heart.

Of unusual interest was Spiller's case of *hemieraniosis*.<sup>2</sup> Following an operation, in which a considerable section of bone on the affected side was removed, there was a recurrence of symptoms, and at a second operation beneath the dura a tumor was found and removed. More than a year has elapsed since the operation was performed. The patient is now entirely well and has had no signs of recurrence.

**PUNCTURE OF THE BRAIN.** Though recently taken up and enthusiastically advocated by some, puncture of the brain is by no means a new operation; with trephining it was practised in the time of Hippocrates. Among its most earnest advocates are Payr and Kocher, Schmidt and Middeldorpf, Neisser and Pollack. To the latter we owe one of the latest important publications,<sup>3</sup> containing the report of 136 operations on 36 cases. I must confess not to have regarded it with favor, at least as a diagnostic measure. If the symptoms point to the presence of a lesion within the cranial cavity, whether it be a cyst, a tumor, an abscess, or a blood clot, the indications for operation, that is exposure of the lesion, are equally clear. Puncture of the brain reminds one too forcibly of the old-fashioned use of the exploring needle, in abdominal lesions, now replaced by the exploratory operation. These objections, of course, do not hold good when brain puncture is used as a therapeutic measure, as for hydrocephalus.

The operation itself is not a difficult one: a puncture of the scalp, a

<sup>1</sup> Australasian Medical Gazette, June 20, 1908.

<sup>2</sup> Journal of the American Medical Association, xlix, No. 25.

<sup>3</sup> Mitteilungen aus der Grenzgebieten der Med. u. Chir., Band xiii, Heft 4, 5.



small hole bored in the skull with a blunt drill, the introduction of a fine hollow needle fitted to a Pravacz syringe—these are the various steps. There seems to be no limit to the number of times the operation may be repeated, Neisser puncturing the brain of one patient in nine different places before he succeeded in locating the tumor. The necessity of exercising precaution in the selection of the site of puncture need scarcely be mentioned. Important areas as the motor cortex should be avoided, as should also the seat of large vessels and sinuses.

In cases of hydrocephalus the lateral ventricles may be approached from three different directions: (1) By the von Beck method. The cranium is opened 3 cm. to the side of the median line and 4 cm. above the external occipital protuberance; the needle must be introduced 3 cm. before it reaches the tip of the posterior cornu. (2) By the Keen method, from the side; the opening in the skull is made 3 cm. behind and 3 cm. above the external auditory meatus. The needle is directed toward a point 6 cm. above the external auditory meatus on the opposite side. In this region the lateral ventricle lies from 4 to 5 cm. from the surface. (3) By the Kocher method in which the needle is introduced downward and backward to a depth of 5 or 6 cm. from a point 2 cm. from the median line and 3 cm. from the precentral fissure.

**LUMBAR PUNCTURE AND BRAIN TUMORS.** Lumbar puncture is usually regarded as a very dangerous and unwarranted procedure when there is known to be a tumor in the posterior fossa. In discussing the treatment of cerebellar tumors, Siemerling<sup>1</sup> seems to think that the pendulum has begun to swing the other way, and that lumbar puncture now has more advocates than it used to, Seiffer among others supporting lumbar puncture with certain stipulations. He believes it may be used with propriety when the pressure is increased, and that in withdrawing the fluid the pressure should not be allowed to go below 100 (presumably millimeters of water). Though having used it a number of times, Siemerling has never seen any bad results either in tumors of the cerebellum or in tumors of the cerebrum. Of course, he realizes the importance of keeping a careful watch over the degree of intraspinal pressure and of being guided somewhat by the symptoms. A sharp fall of pressure and sudden, severe headache are always to be regarded as danger signals.

**TUMOR IN THE CEREBELLOPONTILE SPACE.** The mortality after operations for the removal of tumors from the cerebellopontile space has been very high. Meyer<sup>2</sup> was fortunate enough in having his patient recover from the operation. The tumor was a fibrosarcoma, taking its origin from the *acoustic nerve*. The operation was performed with the body of the patient elevated, face downward. Following the suggestion of Dawbarn, blood was stored in both lower extremities for emergency purposes. Anesthesia was administered partly by oral tubage and partly

<sup>1</sup> Berl. klin. Woch., 1908, No. 14

<sup>2</sup> Annals of Surgery, August, 1908

by the mask. The usual horseshoe-shaped incision was made from the tip of one mastoid to the other, reaching about two fingers' breadth above the occipital protuberance, the bone on either side and the intervening bridge was removed, and a double ligature applied to the longitudinal sinus. Retraction of the cerebellum to expose the cerebellopontile space was followed by very profuse hemorrhage, which was readily controlled, however, by digital compression. Further exploration revealed a bluish white tumor about the size of a cherry near the internal auditory meatus. It was comparatively easily shelled out in pieces. The report was made about eight weeks after the operation, at which time there was some gradual improvement in the patient's eyesight and other symptoms.

**The Technique of Craniotomy.** Bryant<sup>1</sup> gives a brief description of a new motor which he recommends for operations upon the skeleton, being especially adapted to cutting osteoplastic flaps. He claims it to be the first practical application of well-known electrical principles in such a way as to combine three-tenths horsepower with a weight of only 7 pounds, about one-eighth of that of the ordinary motor of equal power. It can readily be held in the hand, and in this way solves the problem of shafting or gearing, by doing away with both. The speed of the motor is 15,000 revolutions per minute. With this high velocity the instrument cuts bone with great rapidity. Because of its high speed a phrase is used with only one cutting edge which cannot clog. The phrase does not heat at all, as the heat generated is taken up by the chips.

The description of this motor appeals very much to one who is in the habit of using a phrase or spiral osteotome for making osteoplastic sections of the skull. It is extraordinarily light for the power, and should, I think, be very easily manipulated. There is but one objection, so far as I know, namely, the price. After one or two trials I was informed by the makers that the price would be in the neighborhood of \$600.

Wood<sup>2</sup> has made very important modifications of Stellwagen's trephine, with which surgeons are familiar. One modification consists in the attachment of a handle to the end of the arm carrying the saw. The saw is manipulated by moving this handle backward and forward rather than by the tiresome supination and pronation by which the original Stellwagen trephine is operated. Wood has also devised a means of preventing the central pin of the shaft from slipping, without resorting to the necessity of using the plate of the original Stellwagen instrument. The instrument, as Wood has modified it, should prove to be very satisfactory. Some surgeons may prefer it to the phrase or the Gigli saw.

Quite an important feature of the technique of craniotomies is *hemostasis*. In making large flaps a great deal of blood may be lost in a comparatively short time, quite enough in some instances to affect the outcome of the operation. For all practical purposes a rubber tube or band

<sup>1</sup> *Annals of Surgery*, August, 1908.

<sup>2</sup> *Ibid.*, May, 1908.



fastened securely around the head meets all the indications, that is, for all operations above the plane of the equator or the level of the base of the skull. Various methods have been suggested as substitutes, however, as that described in *PROGRESSIVE MEDICINE*, March, 1908, which consists in making compression upon the vessels along the outer side of the margin of the flap through the medium of specially constructed metal plates held in place by sutures penetrating the entire thickness of the scalp; or Heidenhain's method of running a continuous overlapping suture on both sides of the projected incision. Subsequently von Hacker modified Heidenhain's method somewhat in that the interrupted suture was tied at certain intervals and the suture was introduced only in the outer or convex and not on the inner margin of the incision. To prevent the access of much blood to the flap, the base of the flap was so placed that it did not correspond to the direction of any important vessels. Thus, if the flap were in the temporal region, the base of the flap was directed either backward or forward so as not to admit the temporal artery.

Pollak<sup>1</sup> records a series of cases in which von Hacker's method was used. A number of illustrations show the relative position and size of the flaps, and I was at once struck with the fact that the flaps are from one-half to one-third smaller than those I am accustomed to use. This is a very important practical consideration, for when making large osteoplastic flaps it is important that one should have a very liberal blood supply, otherwise the nutrition of the flap will not be maintained and necrosis of bone in the flap may ensue. As a matter of routine, unless there is some contra-indication, the flap should be so placed as to provide for the entrance of one of the main arterial stems. This precaution should be taken especially in elderly patients with arteriosclerosis. In flaps as small as these depicted in Pollak's illustrations the vascular supply is a matter of small consequence.

**Hydrocephalus.** With the exception only of meningitis, hydrocephalus is the only lesion of the cranial contents which offers apparently insurmountable difficulties to treatment by surgical means. In the treatment of traumatic affections, of abscess, of tumors, of lesions of the Gasserian ganglion, the surgeon has made rapid strides. Not so with hydrocephalus. So far the results of every method of treatment has been almost nil, so that the condition seems well-nigh hopeless. Under normal conditions the lateral ventricles have a sufficiently free communication with the subarachnoid lymph space through the foramen of Monro, the aqueduct of Sylvius, the foramen of Magendie, and the two lateral apertures to the fourth ventricle. When any one of these passages is closed the fluid secreted by the choroid plexuses within the ventricles accumulates and leads to an internal hydrocephalus. Whether the

<sup>1</sup> Beiträge f. klin. Chir., Band lv, Heft 3

accumulation is due primarily to an inflammation of the ependyma or whether to engorgement of the choroid plexus, possibly to both, is a matter of importance only to the neuropathologist. To the surgeon the condition which he is called upon to relieve is the imperfect drainage of the lateral ventricles, whatever be the cause.

Up to the present time we have had a number of suggestions whereby the ventricle may be drained: into the tissues of the scalp (Wernicke, Keen; and Broca), into the subaponeurotic space (Mikulicz); into the loose cellular tissue in the lumbar region (Quinke and Winter); into the retroperitoneal space or abdominal cavity (Ferguson and Nicoll). There are two objections to all these methods: (1) That the period of drainage is limited, and (2) that there is the danger of infection when draining toward the body surface. The scheme of draining through the spinal canal into the abdominal cavity could, of course, be adopted only in those cases in which there is a free communication between the spinal lymph space and the dilated ventricles—a condition which in the majority of cases does not exist. An ideal system would be one in which drainage would not be interrupted, one which avoids direct communication with the surface of the body, and in which the principle was one of capillary drainage or of gravity. In the past year we have had two additional suggestions, which while resourceful have thus far been unsuccessful. Sherman<sup>1</sup> attempted to drain the ventricle into the pleural cavity, and Payr<sup>2</sup> into the longitudinal sinus. Sherman first withdrew 50 c.c. of fluid from the right lateral ventricle, and about two weeks later 60 c.c. Two months afterward he drained the right lateral ventricle into the subaponeurotic space by means of strips of rubber tissue. The fluid accumulated in large quantities beneath the scalp, but was not absorbed. The operation was repeated in the left side with similar results. Discouraged by the failure of these methods, he resolved to attempt to establish a direct communication between the space where the fluid had accumulated and the pleural cavity. By blunt dissection a strip of rubber dam was passed beneath the skin of the neck, one end inserted into the pleural cavity, the other into the above-mentioned space. The scheme failed; the wound did not heal and the child died from the usual cause, namely, meningitis.

Payr<sup>3</sup> proposes drainage of the lateral ventricle into a cranial sinus through the medium of a transplanted bloodvessel. Based upon a series of original investigations and a review of our present knowledge of the surgery of bloodvessels, he came to the conclusion that for this purpose veins were preferable to arteries. Because of its accessibility and the fact that under normal conditions it drains off a greater portion of the cerebrospinal fluid the superior was preferred to other sinuses.

<sup>1</sup> Southern California Practitioner, vol. xxii, 605.

<sup>2</sup> Vide infra.

<sup>3</sup> Archiv f. klinische Chirurgie, Band lxxxvii, Heft 4.



Payr describes his technique in great detail; the steps of the operation are briefly as follows: Exposure of the field of operation by the reflection of an osteoplastic flap. Parallel with and bisected by the coronary suture, the base of the flap 2 to 3 cm. broad should be at least a finger's breadth from the sagittal suture. To relieve tension and minimize hemorrhage some fluid is withdrawn from the ventricle by a fine trocar graduated in centimeters so as to determine the distance of the ventricle from the surface. Prior to this a section of the saphenous vein of the proper length is removed, wrapped in gauze saturated with normal saline solution, and immersed in warm (37° C.) sodium chloride solution.

The longitudinal sinus is then freed for a distance of 2 to 3 cm. and at either end provisional hematoses secured. This step of the operation is attended with some difficulty because of the number of pial veins emptying into the sinus, of the presence of the Pacchionian bodies, and of the triangular shape of the sinus. Hemorrhage is best controlled by encircling the sinus at either end of the isolated section with rubber bands. Following the approved technique of vessel suture, the vein is now sutured to an opening in the sinus and the other end introduced into the ventricle. In order to avoid exposure of any but an endothelial surface at the site of the suture, a cuff composed of the wall of the vein is turned back. Before closing the wound the vein is anchored in place by two or three sutures through the pia and arachnoid.

As to the clinical results: Three patients were operated upon in all, but in none did the author succeed in obtaining continuous drainage. The first case died of secondary infection of the ventricle five months after drainage of one and three months after drainage of the other ventricle; the second case died within two hours of the operation. In neither of these cases was any blood found in the ventricle, nor was there any thrombosis in the longitudinal sinus. The openings in the dura were not closed. The difficulty of securing accurate approximation of the margins of a dural flap suggests the advisability of substituting for a dural flap a simple linear incision at right angles to the sinus. The importance of primary union of the dural wounds in hydrocephalus cannot be overestimated. The persistence of a sinus invariably is followed by secondary ventricular infection.

Despite the fact that none of the three cases survived the operation sufficiently long to prove that the method of procedure may be relied upon as a means of permanent ventricular drainage, Payr believes the operation is founded upon sound anatomical and pathological principles and is worthy of a further trial. The failures he attributes rather to certain technical mistakes. The important truths established by his observations were: (1) That veins may be depended upon to serve as a drainage canal without alteration of structure; (2) that vascular anastomosis with the longitudinal sinus has no insuperable obstacles; and (3) that the ventricular pressure and the valves of the veins together prevent the blood from the veins entering the ventricle.

With the hope of deriving some practical suggestion on the subject, I read with a great deal of care the lengthy article of Kausch.<sup>1</sup> Confining his remarks to hydrocephalus of the congenital or early acquired type, he refers to the current opinion as to the etiology, describes the means of escape of the cerebrospinal fluid from the lateral ventricle, the means of communication with the subarachnoid space, and the methods by which the fluid may find its way out of the skull (Pacchionian bodies, lymph tracts, nerve sheaths, etc.). In speaking of the diagnosis, he publishes a table by which one can determine the proper proportions of the circumference of the head to the eye, chest measurement, and length of body:

Age in months.	Circumference of head. cm.	Difference according to circumference of chest. cm.	Length of the body. cm.
1 . . . . .	37.5	+1.2	57.5
3 . . . . .	40.0	+0.5	65.0
6 . . . . .	42.5	-0.2	72.5
10 . . . . .	45.0	-1.1	80.0
15 . . . . .	47.5	-1.8	87.5
21 . . . . .	50.0	-2.6	95.0
28 . . . . .	50.4	-3.4	100.0
36 . . . . .	50.8	-4.1	105.0
45 . . . . .	51.1	-4.9	110.0
55 . . . . .	51.9	-6.4	115.0

A variation of  $\frac{1}{20}$  to  $\frac{1}{10}$  from the normal Kausch regards as the mild cases,  $\frac{1}{10}$  to  $\frac{2}{10}$  as moderate, and  $\frac{2}{10}$  to  $\frac{4}{10}$  as high grade. In the differential diagnosis one must consider tuberculous meningitis with serous exudation, tumors with hydrocephalus, and finally the rachitic type of hydrocephalus. The principal feature of the contribution of Kausch is the discussion of the surgical treatment of the 14 cases from the Mikulicz clinic. Leaving out of consideration treatment by compression now practically abandoned, the oldest therapeutic measure is aspiration of the lateral ventricles. The latter has in the majority of cases been unattended with any improvement, although there are a few cases on record in which ventricular puncture had been followed by considerable amelioration (2) or recovery (6). If undertaken at all, it is safer to tap the ventricles more frequently than to withdraw too much fluid at one time. From 60 c.c. to 100 c.c. is regarded as a reasonably safe amount to withdraw, and should alarming symptoms develop they should be controlled by circular compression. Ranke suggested iodine injections, but these are both dangerous and useless.

As with ventricular drainage, so with lumbar puncture, the number of cases benefited is insignificant as compared with the number of times it has been practised. Permanent drainage of the ventricles was first

<sup>1</sup> Archiv f. klinische Chirurgie, Band lxxxvii, Heft 3.



suggested by Wernicke in 1881, and practised by Pollak in 1884. Of the first 12 cases reported by various observers, 11 died. It is interesting to note that in 1873 Stephen Paget practised, though unsuccessfully, drainage of the spinal subarachnoid space by resecting the arches of the fourth and fifth cervical vertebræ.

To Mikulicz (1893) is accredited the suggestion of permanently draining the ventricles into the subarachnoid space. Of 7 cases from Mikulicz's clinic operated upon by his method, all died; only 2 survived the operation any length of time (1 six weeks, and 1 seven months).

Undoubtedly the most ingenious of the schemes for securing permanent drainage of the ventricles was proposed by Ferguson. The latter conceived the idea of draining into the peritoneal cavity because of its enormous capacity for absorption. Applied to two cases, the first died from the effects of the operation, the second three months later from bronchopneumonia. In the series of 14 cases reported by Kausch the method of Ferguson was applied but once, with the usual result (death on the seventeenth day).

In his own series 1 was treated by ventricular and lumbar puncture, 1 by subdural drainage, 8 by subcutaneous drainage, using in one case a silk thread, and in another a rubber tube, and in the remaining 6 the gold tube of Mikulicz. In one instance he combined the subcutaneous drainage of both the cerebral and lumbar subdural spaces, and once peritoneal drainage of the lateral ventricle. Taking it all in all, the results in the surgical treatment of his cases were most discouraging. In only one was there complete recovery. The question arises as to whether or not the surgical treatment of hydrocephalus should not be abandoned altogether. When one takes into consideration, however, the fact that there are a certain number of cases (be they ever so small) which are eventually cured, it would seem to be the duty of the surgeon to continue his investigations with the hope of improving the technique of the methods now in use or of discovering some more efficient therapeutic measure.

Of the 13 recoveries which Kausch has been able to collect from literature, 6 were treated by repeated puncture of the ventricles, 4 by repeated lumbar puncture (twenty-five times in one case), 2 cases recovered with open drainage of the ventricle, and 1 after subcutaneous drainage of the lumbar subdural space.

In some instances it is proper to use antisyphilitic treatment, but even in cases believed to be of syphilitic origin surgical measures should not be postponed too long when there is a high degree of tension. As to the surgical treatment, there are three methods to be taken into consideration:

1. Drainage of the ventricle.
2. Drainage of the subarachnoid space.
3. Drainage of the subdural space.

The author advises the use of subcutaneous drainage of the subdural

space in cases of spina bifida associated with a mild grade hydrocephalus. He attaches more importance to repeated puncture than to any other feature of the treatment, and recommends alternate puncture of the ventricles and lumbar subdural space. Ventricular puncture may be made through the sutures or fontanelles, also avoiding the median line. In exceptional cases, should the sutures and fontanelles be closed, he then follows the suggestion of Kocher and punctures the ventricle through a small opening bored in the skull, using for subsequent punctures the same opening, but introducing the needle in different directions. If any cerebral complications arise, the head should be lowered at once and, if necessary, compression made. Puncture should be repeated just as fast as the fluid re-accumulates, usually on an average of eight to fourteen days. This can be determined by measurement of the circumference of the head and by the appearance of the fontanelles.

**Meningitis.** Ballance has made a number of very important contributions to the surgery of the central nervous system during the past few years, the most important of which, of course, is his book, published in 1907, on *Some Points in the Surgery of the Brain and its Membranes*, representing the Lettsomian Lectures. To those who are interested in the surgery of the central nervous system I heartily commend this work. It represents very largely the result of his own experience. The book is profusely illustrated and contains a number of very instructive case records. Not an inconspicuous part of the work is that devoted to the subject of meningeal inflammation, a lesion with which surgeons have been struggling for many years, and still more or less hopelessly.

In an address delivered before the Brighton and Sussex Medico-Chirurgical Society, Ballance<sup>1</sup> discusses among other things the question of *meningeal inflammation*. The forms of meningeal inflammation with which the surgeon may be called upon to deal are meningitis serosa, localized or diffuse suppurative meningitis, and tuberculous meningitis. By the term *meningitis serosa* is understood an accumulation of fluid in the subarachnoid space and in the ventricles. This accumulation of fluid is in all probability a hypersecretion of toxic origin. It is met with most frequently during youth and early adult life, almost 50 per cent. occurring between the tenth and fifteenth years. The symptoms are those of increased intracranial tension and cerebral irritation, often accompanied by more or less decided evidence of a lesion of some particular part of the brain. If the local inflammation is very acute, there may be a local encephalitis serosa, which yields to incision like inflammatory edema of a limb. The symptoms induced by meningitis serosa are fever, a slow pulse, vomiting, and drowsiness. All these may be relieved by lumbar puncture, and in some cases, no doubt, a serous meningitis may be pre-

<sup>1</sup> *Lancet*, December 21, 1907.



vented from becoming a purulent meningitis, just as a serous pleurisy may sometimes be prevented, by aspiration, from becoming an empyema.

In the treatment of *suppurative meningitis* one must bear in mind that the inflammation may involve either the subdural or subarachnoid cavity. When, on opening the subdural space, we meet with a sheet of pus, we have no means of ascertaining how far it extends, and it is difficult or impossible to remove the pus by irrigating from one opening to another. Continuous irrigation is conceivable, but cleansing by sponging is impossible unless a large opening has been made. Ballance has for several years advocated in the treatment of meningitis a free bilateral opening, so as to allow of the escape of pus from the subarachnoid space. This may be combined with a lumbar puncture and irrigation directly from the cranial to the spinal cavity.

As for *tuberculous meningitis*, here again the problem is varied according to whether the subdural or subarachnoid space is the seat of the lesion. As a matter of fact, we know that in most instances the inflammation involves the subarachnoid space, so that if, as the practice goes, one simply opens the subdural space and closes it again, as one would in tuberculous peritonitis, it is not likely that the process will be in any way influenced any more than opening the pleura would influence a disease of the pericardium.

**Abscess of the Brain.** SECONDARY TO A PUNCTURED FRACTURE OF THE SKULL. The majority of punctured fractures of the skull are the result of bullet wounds received in battle. Owing to the high velocity of the bullet and the destructive injury to the brain tissue these cases, as a rule, are rapidly fatal. In civil life the wounds are caused generally by other instruments or by low velocity firearms. In this case the skull offers enough resistance to take up most of the energy of the fracturing force, and there is, therefore, less injury to the brain. The two great dangers of puncture and fractures are hemorrhage and infection. The case of abscess reported by Ross<sup>1</sup> is of interest, particularly because of the absence of any evidence of external injury, at least, upon superficial examination. The patient was brought to the hospital five days after he was supposed to have been hit over the eye with an umbrella. The right eye was the seat of a conjunctivitis and the eyelids were puffy. There was no discoloration, ecchymosis, or external evidences of abrasion in or about the eye. A few days later he developed some focal symptoms, which together with evidence of intracranial pressure and of infection seemed to call for operative intervention. The skull was opened in the parietal region and a subdural abscess containing 150 to 200 c.c. of pus was discovered. Two days after the operation the patient died suddenly of respiratory failure. The postmortem examination is interesting, as showing the way in which the umbrella penetrated the skull and opened an avenue of infection.

<sup>1</sup> Annals of Surgery, January, 1908

The skullcap was removed and the brain exposed. An abscess cavity, about the size of a large orange, was found in the right temporo-sphenoidal lobe. An investigation of the middle fossa showed a fracture of the greater wing of the sphenoid, a little below and to the outer side of the outer end of the sphenoidal fissure. Several loose spicules of bone were removed and the fracture opening was found to be nearly circular. The right eye was removed, exposing the floor of the orbit. A fissured fracture with a loose fragment of bone was found opening the roof of the antrum of Highmore. The antrum was full of pus, and showed a fracture of the inner wall into the nose. The line of penetration was then from before backward, from nose to antrum, antrum to orbital cavity, and thence to the middle fossa of the skull, thus furnishing an avenue of infection direct from the nasal cavity to the temporosphenoidal lobe of the brain. A straight probe could be made to traverse the entire tract without obstruction.

**TYPHOID INTRACRANIAL ABSCESS.** Prior to the patient's admission to the hospital, although no clear history could be obtained, there was some evidence of his having received a blow upon the head. In the right parietal region the scalp was edematous, red and tender, and there appeared to be a depression of the skull with an indefinite raised edge. In addition to this the patient presented symptoms of typhoid fever. About five days after his admission the swelling on the scalp became softer and fluctuating. Under chloroform anesthesia, an incision was made and 60 c.c. of pus were evacuated, and a linear fracture of the parietal and frontal bones was exposed. Upon removing a button of bone a large organized epidural clot was laid bare, over which was spread a thin film of pus. The clot was evacuated, the cavity irrigated with hot saline solution and packed with strips of iodoform gauze. Within three weeks the temperature gradually dropped to normal, and convalescence was uninterrupted. The recorders, Gurd and Nelles,<sup>1</sup> believe the infection in this case was evidently of hematogenous origin. The case illustrates the influence of trauma in the development of typhoidal abscess.

### THE CRANIAL NERVES.

**Trifacial Neuralgia.** The so-called Schlösser method, the *injection of alcohol* into the second or third divisions of the ganglion at their emergence from the skull, is still on probation. There is no question as to the immediate relief afforded by the treatment, after from one to four injections, but we have as yet no assurance as to the permanency of the relief. In Patrick's series, referred to below, in 13 cases the average period of relief was between six or seven months, the longest fourteen, and the shortest

<sup>1</sup> *Annals of Surgery*, January, 1908.



one month. That the treatment is applicable only to these cases in which the pain is referred to, the second or third division is no longer disputed; at least, the risks attending attempted injections of the first division are conceded to be so great that further attempts should be abandoned. Therefore, when the first division is involved in addition to the second or third the central operation on the ganglion offers the only hope of relief.

The last report from Patrick<sup>1</sup> on injections of alcohol, includes a series of 23 cases. Of these, there was one absolute failure; 2 recurrences in five months and 1 in three months; 5 cannot be included because only a few days had elapsed or after one injection the patient was lost sight of; of the remaining 13 the average period of relief when the report was made was between six and seven months, the longest period fourteen months, and the shortest one month. At the first injection Patrick uses 2 c.c. of 75 per cent. alcohol and 10 minims of chloroform; at subsequent injections he increases the alcohol to 90 per cent.

Kiliani,<sup>2</sup> in his series of 55 cases, had 4 failures and 4 from which he could obtain no report. The remaining 47 are free from pain, although no mention is made of the period of relief. In one case the injection was followed by oculomotor palsy.

Sicard's<sup>3</sup> experience includes 63 cases, 41 women and 22 men. In 48 cases the neuralgia was on the right and 14 on the left side. In 21 cases the second divisions were involved, in 31 cases the first and second divisions, and the second division alone eleven times. In studying the results of treatment he divides his cases into two classes: (1) Those which had been treated previously by surgical methods; (2) those which had not. Those in the first category were not half as much benefited by injection as those in the second. In one case, in which the patient had been operated upon three different times, he was unable to produce any effect upon the pain until he alcoholized the branches of the trigeminal on the sound side. The results have been, with the exception of two cases, uniformly good. As his technique and methods have become more perfect, the periods of relief have become longer. Three of his cases have remained well from eighteen months to two years. In most cases the treatment must be resumed at the end of six months, but recurrences are apt to be less severe each time that they appear. He is convinced that the injection of alcohol into the Gasserian ganglion is the ideal treatment for those cases which do not respond to alcoholization of its branches. On dogs, at least, it has been followed by complete degeneration of the ganglion cells.

In the treatment of 60 cases included in Jaboulay's<sup>4</sup> report a number of methods were used; for some extracranial operations on the peripheral nerves, intracranial operations on the Gasserian ganglion itself, excision

<sup>1</sup> *Lancet Clinic*, December, 1907.

<sup>3</sup> *Presse Médicale*, May 6, 1908.

<sup>2</sup> *Medical Record*, January 18, 1908.

<sup>4</sup> *Lyon Médical*, 1908, vol. cx,

of the cervical sympathetic, or a combination of these methods. In only 38 has he been able to follow the cases sufficiently long to enable him to draw any satisfactory conclusions. All the cases had been treated medically without material benefit. There were 8 involving the third division, 4 the second and third divisions, 6 the second division alone, 10 the first and second divisions, and 10 all three divisions.

In presenting his results, he regarded as cured only those cases which were absolutely free from pain or from any serious complication. As improved are classified those in which the pain was distinctly less, or where there was only some slight sensory disturbance, such as hyperesthesia to cold, speech, or mastication. Of the peripheral avulsions, there were 16 recoveries, the period of relief lasting from twenty-two months to eight years. Stretching of the supra-orbital nerve was followed by relief for thirteen months; removal of Meckel's ganglion, four months. Whenever there was any recurrence the subsequent attacks were, as a rule, less severe; in some cases the pain was so mild that the patients did not care to consider another operation. He called attention to a rather interesting fact that in certain instances a cutaneous anesthesia has been noted, even with the persistence or recurrence of pain, while in other cases there is a condition of sensitiveness to touch with complete analgesia or loss of pain. There were only three operations in which the Gasserian ganglion was removed, and of these two died suddenly, one either from hemorrhage or meningitis. In the third attempt he succeeded in removing only a portion of the ganglion, but intracranial section of the third division was followed by relief for three years.

Jaboulay is still of the opinion that *excision of the cervical sympathetic* is more lasting in its effect. Of 5 cases in his series, 1 has remained free from pain nine years, another twenty-six months, a third seventeen months; the fourth case was a failure, and in the fifth case there was a decided improvement, which continued for thirty-eight months. There were 9 cases in which he practised avulsion of the peripheral nerves with excision of the cervical sympathetic. Of these, 3 were reported as cured, 3 with slight recurrences from one to four years after the operation, and in none of these cases was there any disturbance of vision, but always vasodilatation involving one-half the face. While it is very hard to lay down any definite rules in the selection of one or the other of these methods of treatment, the cases with vasomotor and secretory disturbances seem to Jaboulay particularly suitable for sympathectomy. He considers gasserectomy too serious an operation to be undertaken except in the most severe and exceptional cases, and even then recurrences have been so frequent that he is inclined to disapprove of it altogether. If one prefers to operate directly upon the ganglion, it is very much better to divide the sensory root as it passes over the petrous bone.

We must bear in mind that Jaboulay has always been a strong advocate of excision of the cervical sympathetic, and his personal experiences



with gasserectomy explain to some degree his skepticism about this operation. His position is quite unique and his statements unsustained by the results of experienced surgeons.

Still another method of avoiding the major operation on the Gasserian ganglion is proposed. Wright<sup>1</sup> exposes the foramen ovale and through it injects *osmic acid* by means of a curved dental syringe into the ganglion. To expose the foramen he resects and turns down the zygoma, and divides and turns up the coronoid process. The inferior dental and lingual nerves are traced up to the ganglion, the latter injected and the nerves torn away. He practised the operation on two cases, but "the time is too short to enable him to say the relief is permanent, and the operation is not an easy one."

Unless the first division of the fifth nerve is involved the ganglion should not be exposed according to Ballance,<sup>2</sup> nor should the nerve be divided behind it. In these cases he agrees with those who advocate simple *intracranial division of the second and third divisions*, not even going so far as Hutchinson, who, I think, advocates a removal of the lower and outer half of the ganglion. Ballance has had one case of recurrence four and one-half years after the operation, a case in which he also plugged the foramen with gold leaf. The intracranial division of these two branches is so simple, and operation so devoid of the risk of hemorrhage or of opening the intradural space, or anesthesia of the cornea, that even if in all cases the pain returned after five years, Ballance would prefer this operation to the removal of the ganglion, for it can be repeated with great ease.

I cannot altogether subscribe to this point of view, although I believe that in certain cases we should not attempt to remove the ganglion. In my experience, once the ganglion has been reached, the middle meningeal artery having been tied, the subsequent steps of the operation which I have practised, namely, avulsion of the root, are not difficult. It is little if any more difficult to divide the sensory root than it is to divide the second or third divisions. I can realize, however, that there are certain cases, particularly those where the hemorrhage may be very profuse, where the condition of the patient would not permit of an unduly prolonged operation, when one should feel content with simple division of the second or third divisions, as Ballance advises; however, there is no question in my mind but that in a series of 100 cases we would find a very much larger percentage of recurrences, even though in four or five years after the simple division of the second and third divisions, than after avulsion of the ganglion or division of the sensory root. If we can show that the mortality will be no higher after one of the latter operations, these should be regarded and accepted as the operations of choice.

**Auditory Nerve.** Thus far there have been very few operations upon the eighth nerve which have been performed for the relief of tinnitus,

<sup>1</sup> Lancet, December 7, 1907.

<sup>2</sup> Ibid., December 21, 1907.

possibly only five or six. During the past year I have had an opportunity myself to divide the auditory nerve for persistent *vertigo*. At some subsequent time Dr. Mills and myself will make a full report of this case; suffice it to say now that the operation was not attended with any special difficulty, except in the efforts to separate the facial from the auditory nerve. I have done the operation a number of times on the cadaver, and have always noticed how with a little retraction of the cerebellar hemisphere away from the petrous bone the two nerves are at once put upon the stretch and easily differentiated from one another. On the living subject I found this impossible, and it was only by great perseverance and patience that the seventh nerve was isolated before the auditory was divided.

Among the recent contributions to the surgery of the acoustic nerve, one of the most important is that of Ballance,<sup>1</sup> who divided the nerve for a case of painful *tinnitus*. The patient was a woman, aged forty-nine years, who for two years had complained of tinnitus, vertigo, and nausea. She was almost entirely deaf in the right ear. There were no signs of gross intracranial lesion, and the disease seemed clearly labyrinthine. The symptoms became so aggravated that the patient feared suicide or insanity. Before undertaking the more radical operation it was decided to see what benefits would be derived from removal of the semicircular canals. This relieved the vertigo altogether, but had no effect upon the tinnitus. Accordingly, on January 18, in a two-stage operation with an interval of nine days, Ballance exposed and divided the auditory nerve. According to his statement the operation was not a difficult one, and he found that in displacing the cerebellar hemisphere to one side marine sponges were very much more useful than the ordinary metal retractor. The idea of using them in this connection was suggested to him by his associate, Dr. Lake. When the hemisphere was displaced in this way it remained so retracted as to give a very free exposure of the various nerves in the posterior fossa, namely, the fifth, seventh, eighth, ninth, tenth, eleventh, and twelfth. He found by pressing the eighth nerve that the seventh was brought into view so that it was easily isolated and protected from injury. No attempt was made, however, to separate the nerve of Wrisberg. On the patient's recovering from the anesthetic there was conjugate deviation of the eye to the left and no motion to the right. Convalescence was very slow and interrupted by occasional syncopeal attacks and feelings of impending suffocation. About two months after the operation there was slight paralysis of the right palate and pharynx, nystagmus, and absolute deafness, but no anesthesia or ataxia. By May 24, about five months after the operation, the painful tinnitus had entirely disappeared, and apart from a slight deviation of the tongue to the left and the deafness, the patient had almost fully recovered from the effects of the operation.

<sup>1</sup> *Lancet*, 1908, vol. ii.



As a result of his experience in this case Ballance is quite enthusiastic in his indorsement of the operation as the only means of affording real relief in these distressing cases. Removal of the semicircular canal, of course, cannot relieve tinnitus, as the cochlear must be destroyed or the cochlear division of the auditory nerve divided. Just as in dividing the root of the trigeminal we may hope some time to be able to save its motor root, so in division of the eighth some means may be devised of sparing the nerve of Wrisberg. The labyrinthine symptoms originate in the cochlear ganglion, or in the vestibular ganglion, or in both, but there is no means, so far as we know, of separating, surgically at least, the cochlear and the vestibular divisions of the acoustic nerve.

### THE FACE.

**Diffuse Hyperostoses of the Skull and Bones of the Face.** This is a disease to which Virchow first gave the name *leontiasis ossea*, but in Bockenheimer's review of the subject,<sup>1</sup> he takes exception to this nomenclature, as it is not sufficiently descriptive of the nature of the process. He prefers the term diffuse hyperostoses of the skull and bones of the face. That the disease is a rare one there is no doubt, since only 25 cases have been recorded in literature. In a record of some 400,000 cases in the late von Bergmann's clinic, during the past twenty years, there have only been 5 cases. These cases are described in some detail in Bockenheimer's contribution, which contains also brief clinical notes of 21 of the 25 cases. The lesion evidently at first is circumscribed, limited to a single bone, or even to a part of one bone, but as time passes on the process gradually extends in various directions from the primary focus. Sometimes, however, the disease seems to skip from one bone to another, leaving a section of intervening bone unaffected. In the majority of instances it is a unilateral affection, at least in its early stages; only in exceptional instances does there seem to be a symmetrical development. The characteristic features in the enlargement of the bones are these: (1) They are very hard; (2) they are painless; (3) they have no evidence of an inflammatory nature, either in the bones themselves or in the surrounding soft parts. Another characteristic feature is the slowness with which the disease progresses; in some instances scarcely any change will be seen, even in the course of a year. As a rule, the first symptom to attract the patient's attention is an encroachment upon the nares; subsequently there is an encroachment upon the orbital cavity and the structures it contains, and afterward upon the intracranial spaces. The patients frequently complain of the most agonizing headache, sometimes have attacks of delirium, convulsions, and even coma. Finally comes

<sup>1</sup> Arch. f. klin. Chir., Band lxxxv, Heft 2.

the stage of depression in which various forms of mental aberration are noticed, such as dementia and melancholia.

One of the most valuable aids to diagnosis is the x-ray, and in some instances the true nature of the process may not have been discovered until revealed in the radiograph. There are several conditions with which in certain stages it might be confused, such as rickets, osteoma, fibroma, malignant tumors, syphilis, or acromegaly. With the latter there should be no confusion, however, since, as a rule, acromegaly first makes itself manifest in the extremities and does not involve the bones of the face until later.

Histologically the disease may be described as an osteitis deformans fibrosa; at least, in diffuse hyperostosis of the skull and face one finds some sclerosis of the bone. Some portions resemble sarcoma without the clinical evidences of a malignant tumor, the slow course, the formation of cysts, and the wide distribution are also characteristic. The prognosis of this condition is, as a rule, favorable; that is, there is little to be gained by internal medicine, although arsenic and iodide of potassium have frequently been given. There have been cases reported in which the removal of the primary focus has been followed by recovery, and again others in which after operation there was a very rapid recurrence. Surgical therapy may, of course, be indicated for the relief of certain conditions, such as pressure upon the optic nerve, or upon the cranial contents, but so far as the bones of the face are concerned it is better to leave them alone. The etiology of this condition is quite obscure; syphilis is supposed to play an important part, although in none of Bockenheimer's cases was this a factor. Trauma is said to play an equally important part, and by some the process is supposed to be in some ways associated with rickets. A number of other theories have been advanced, but none of them substantiated; for example, one observer attributed it to persistence of the thymus gland, and to certain disturbances of the hypophysis, and again others to some lesion of the nervous system. To Bockenheimer the most probable explanation is that the disease is due to some congenital anomaly, either to misplaced *anlage* or to some congenital malformation.

**Sarcoma of the Eyelid** is a rare affection, but Wieder<sup>1</sup> has collected 44 cases, including one occurring in an infant seven weeks old. Of 28 cases in which the age was mentioned, 4 occurred during the first year and 8 in the first decade. The upper lid was found affected in 54.8 per cent., the lower lid in 29 per cent., all 4 lids in 6.5 per cent., the inner canthus in 6.5 per cent., and the outer canthus in 3.2 per cent. Of 22 cases 12 were males and 10 females. The histological appearance of the growth was noted in 32 cases, and it was found that the round-cell, spindle-cell, and mixed-cell tumor predominated, constituting

<sup>1</sup> Proceedings of the Pathological Society of Philadelphia, March, 1908, p. 61.



together nearly 85 per cent. of the tumors. About 30 per cent. of the tumors were melanotic in nature, and in 4 cases trauma was distinctly mentioned as a causative factor. The tumor reported by Wieder was removed by operation, and nine months later the infant was entirely healthy and free from any sign of recurrence. Wieder also discusses in detail the literature on sarcoma in infants.

**Mixed Tumors of the Parotid Gland** should be easily recognized when we consider the rarity of the other forms of neoplasms in this locality, but, as a rule, the diagnosis of sarcoma or carcinoma is rarely made until microscopic examination detects the true nature of the lesion.

Cordier<sup>1</sup> reports a very large example of this tumor which existed for eight years in the region of the parotid gland of a male aged forty-five years. Removal was followed a year later by recurrence and rapid enlargement of the growth. Cordier excised the recurrent tumor with recovery of the patient, and no evidence of recurrence one year later. Despite the large size of the tumor, about that of a large cocoanut, there was no tenderness or pain on pressure, no disturbance of the parotid secretions, and no involvement of the seventh or eighth nerve. After removal the growth was found to measure six inches in diameter and to present the combination of a sarcoma, chondroma, and myxoma.

Certain writers, such as Volkmann, have doubted the existence of adenomas of the salivary glands, but some instances are reported in the literature.

Lecene<sup>2</sup> has observed a cystic adenoma of the parotid gland in a man aged twenty-nine years. These tumors resemble common mixed tumors, in being encapsulated and lobulated and are composed of a number of cysts with papillary projections lining the walls. They are usually small in size. Microscopically, cystic cavities are seen lined with cuboidal epithelium, and containing a secretion resembling that of the parietal cells. The vegetations are also lined with epithelium and resemble those seen in other organs, such as the kidney and prostate. The connective tissue may be increased in amount and very dense in character. He believes that the tumors are tubular in origin rather than acinous.

Parotid cysts are much more frequent, but accurate descriptions are not so common. Lecene has seen three examples of this affection, and from his study believes that they were branchiogenic in origin and developed in the interior of the parotid. He does not believe, however, that all such cysts must arise from the branchial clefts, but that practically all of those reported have had such origin.

Extirpation is the treatment to be recommended, because puncture and injection of iodine, etc., is unreliable and may lead to parotid inflammation.

<sup>1</sup> Journal of the American Medical Association, 1908, vol. 1, p. 183.

<sup>2</sup> Revue de Chirurgie, January 10, 1908, p. 1.

**Noma** affects the cheek and mouth, as a rule, less commonly the lips, nose, and ears, and rarely the buttocks or labia. It often follows the infectious diseases, especially measles, scarlet and typhoid fevers, diphtheria, dysentery, whooping-cough, and certain forms of ulcerative stomatitis. Children between the ages of two and twelve are almost invariably the victims. The mortality is about 75 per cent. The etiology is uncertain, as various forms of organisms have been held responsible, especially certain forms of the pseudodiphtheria bacillus, the pseudogonococcus, a cladothrix, a streptothrix, etc.

Pawlowsky<sup>1</sup> believes that this disease should be classed as an acute infectious necrosis of the tissues due to a streptothrix. He was able to isolate the organism from the tissues of the cheek in a seven-year-old child, and from the mouth of a five-year-old girl. The diseased tissues were removed by operation, and the organism stained in situ.

**Rhinoplasty.** Last year I mentioned the splendid results obtained by Leischner in twenty-nine operations to repair defects of the nose. In Case XV of his series he used a skin-periosteal flap from the right clavicle. This year Mandry<sup>2</sup> reports and pictures an excellent result wherein he raised a large flap of skin and periosteum from the clavicle and shoulder and sutured it to the edges of a defect caused by lupus of the nose. He was led to adopt this method because of the great difficulty usually experienced in immobilizing the arm to the nose.

Binnie,<sup>3</sup> after failing to find an operation for the relief of deformity after destruction of the cartilaginous septum, but not of the nasal bones, devised the following: "With a very fine tenotome introduced through the skin, all the soft parts attached to the edge of the pyriform opening were divided subcutaneously. This permitted the nose to be pulled forward into fair position. In the middle line, immediately below the bony bridge of the nose, a one-eighth-inch longitudinal incision was made. Guided by the finger in the nose, a tenotome was passed between the skin and the mucosa from this incision to the base of the ala of the nose on each side. From the lower edge of the thorax two thin strips of costal cartilage were obtained (by von Mangold's method) and were drawn through the subcutaneous tunnels made in the nose. These two strips of cartilage have remained in place and have converted a very distressing into a much less unsightly deformity. I believe the result may be much improved by introducing a strip of cartilage longitudinally from just above the lower end of the nasal bones down to the tip of the nose (as Freeman introduces a metal strip for saddle nose), and by the insertion of a very thin scale of cartilage under the skin of each ala like a shingle."

<sup>1</sup> Arch. f. klin. Chir., 1908, Band lxxxv, p. 318.

<sup>2</sup> Beit. zur klin. Chir., 1908, Band lvii, S. 222.

<sup>3</sup> Surgery, Gynecology, and Obstetrics, June, 1908, p. 599.



**The Jaws.** PHOSPHORUS NECROSIS. Teleky<sup>1</sup> observed 11 cases of this disease in v. Eiselsberg's clinic, in 9 of which the lower jaw was affected and in 4 the upper (in 2 cases both being involved). Ten of the patients were workers in safety-match factories. From a study of the results of treatment in these patients, Telky comes to the conclusion that conservative treatment obtains much better results than resection. In those cases where antiseptic mouth washes, incision and drainage of abscesses, and removal of bone sequestra were practised, the cosmetic and functional results were excellent. In the 4 cases where resection of the diseased portion of the jaw was done before the sequestrum had loosened, the results were unsatisfactory because the operation stirred up a latent phosphorus intoxication from the particles of bone in the neighborhood of the resected part which manifested itself as an acute process.

**RESECTION OF THE INFERIOR MAXILLA.** Considerable attention is devoted to this subject in German surgical journals, and the methods proposed are very numerous. Much of the discussion hinges upon the prosthesis to be employed, and whether this shall be attempted in what may be termed an "immediate permanent" manner, or whether a "temporary immediate" followed by a permanent splint is the better technique. Hard rubber, india rubber, celluloid, fresh animal bone, ivory, silver, and other metal splints have all been experimented with. There are methods named after Martin, Stoppany, Fritzsch and Schroder, to mention the most prominent, and as one writer has said the methods proposed would seem to be as numerous as the patients.

Heller,<sup>2</sup> in reporting the method employed in removing a giant-cell sarcoma from the lower jaw of a girl, aged sixteen years, discusses various points in the technique. He prefers an incision about 5 cm. (2 in.) long, beginning at the angle of the mouth and extending horizontally on the cheek. The nerve innervation of the lower lip is saved, the cosmetic effect is good, and small tumors can easily be removed. Kocher's incision below the jaw may be used if it is desired to inspect or remove the lymph nodes. He does not believe the lower lip and chin should be split, except for the removal of very large growths.

The mucous membrane should be completely and carefully sutured, in order to avoid wound infection, but this is not always possible to do and various plastic methods may be required. If the geniohyoglossus muscle is detached from the bone the tongue should be fastened by a catgut suture to prevent its distortion. Heller also discusses in detail the effect upon the stumps of the jaw by the primary pull of the muscles, and the secondary contraction of the scar tissue. If the prosthesis is completed in about eight weeks' time the effect of scar contraction amounts to but little. The internal pterygoid muscle is very powerful in displacing the stumps, and in the case cited, Heller endeavored to prevent

<sup>1</sup> Arch. f. klin. Chir., 1908, Band lxxxvi, S. 369.

<sup>2</sup> Deut. Zeit. f. Chir., 1908, Band xcii, p. 263.

this by detaching it from the bone. He urges the importance of bearing in mind the future functional use of the jaw when operating, and states that paradoxical as it may seem "more must be sacrificed in the interest of function than is required by the extension of the disease."

**PROTHESIS AFTER RESECTION OF THE INFERIOR MAXILLA.** König<sup>1</sup> adds a fourth case to 3 previously reported in which he has inserted a prosthetic appliance after exarticulation of the lower jaw. In his latest case he used ivory to replace a portion of the jaw removed on account of a tumor on the left ascending ramus. The patient was sixty-eight years of age, arteriosclerotic and toothless. The advantage of ivory lies in the fact that in course of time a resorptive (arrosion) process permits the ingrowth of bone which aids in anchoring it firmly in place. The ivory was fastened to the lower jaw by rounding the end fitting into the glenoid cavity and having a projecting peg upon the other extremity, which fitted into a hole driven into the jaw below the exarticulation. The "healing in" of ivory was beautifully shown by Magnuson<sup>2</sup> in the experimental laboratory of the University of Pennsylvania.

Payr<sup>3</sup> has been using different kinds of prosthetic apparatus made of *magnesium*, which in at least one case healed in without a fistula; it was completely absorbed and replaced by a thick and cosmetically sufficient scar. All apparatuses, however, tend to produce a secondary pressure necrosis of the mucous membrane. Accordingly he has recently tried the employment of a piece of rib covered by periosteum, for this purpose. He describes two methods: in one a piece of rib is resected through a small incision below the clavicle, turned so that its concavity looks toward the skin and displaced between the skin and fascia until it is in a suitable position for the flap. The exarticulation of the jaw is performed two or three weeks later and a long, wide, tongue-shaped flap of skin and fascia is reflected, carrying the transplanted piece of rib which is fitted into the defect in the jaw. The second method simply consists in the free transplantation of a piece of rib into the defect.

**JAW TUMORS.** Kühner<sup>4</sup> reports 90 cases of *epulis* from the records of the Tübingen clinic, occurring between 1870 and 1905. Of these 31 were examined microscopically, the findings being as follows:

	Cases
Giant-cell sarcoma . . . . .	20
Spindle-cell sarcoma . . . . .	2
Fibrosarcoma . . . . .	4
Fibroma . . . . .	2
Osteofibrosarcoma . . . . .	1
Granuloma . . . . .	1
Osteoma . . . . .	1
Total . . . . .	31

<sup>1</sup> Deut. Zeit. f. Chir., May, 1908.

<sup>2</sup> University of Pennsylvania Medical Bulletin, 1908, vol. xxi, p. 103.

<sup>3</sup> Zentralbl. f. Chir., 1908, xxv, p. 1066. <sup>4</sup> Beit. zur klin. Chir., 1908, vol. lv.



*Influence of Sex.* Of the 90 cases, 75 (63.31 per cent.) were in women, and 33 (30.71 per cent.) in men. This comparison agrees with the quoted statistics of other authors.

*Age.* The average age of all 90 cases was twenty-six years and four months: Of the men alone, eighteen years; of the women alone, thirty-one years.

*Localization.* The lower jaw, 42 cases. The upper jaw, 36 cases. Upper and lower, 1 case. Of the 49 cases in which definite note as to the location existed, 29 involved the left side and 20 the right.

*Etiology.* (1) Irritation from bad teeth; (2) lack of care of the mouth, practically constant in the reported cases, which all came from the lower classes; (3) use of tobacco—Kuhner points out, however, that as the tumor occurs more frequently in women, there may be some doubt as to the tobacco hypothesis; (4) pregnancy seems to have an influence.

*Clinical Course.* Of the 54 cases the average duration was fourteen and one-half months.

The growth occurs more rapidly in patients in the first two decades of life than in those of middle age. In women the growth tends to be slower than in men.

*Treatment.* In 79 of the reported cases operation was performed, and, excepting a few of the early cases, was radical, including removal of part of the alveolar process. Of the 90 cases, 11 had recurrences.

*Results.* Seventy-seven cases of the 79 (94.47 per cent.) were permanently cured; 2 of these had to be re-operated a second time. Of 4 non-operated cases the following was noted:

One died of general sarcomatosis. Another died in three years of epulis which grew constantly larger. A third died of hemorrhage originating in the epulis. The fourth, a boy aged five years, had a spontaneous recovery.

Kuhner states in conclusion that epulis, when radically treated, is almost always cured. When not operated on, or operated on in an incomplete manner, recurrences may readily occur and even cause death.

SOLID AND CYSTIC ADAMANTINE TUMORS of the jaws are very rare and yet interesting growths, arising from remains of the primitive enamel organ. They are sometimes termed "benign central epitheliomas of the jaws." Histologically they consist of connective tissue derived from the enamel pulp, masses of cylindrical cells from the enamel membrane, and cells from the intermediate layer. Fritsch<sup>1</sup> reports an example of this variety of tumor removed from the left lower jaw of a woman, aged twenty-six years, of about eight years' duration. It began with symptoms suggesting some inflammatory affection. The tumor and one-half of the jaw were removed and immediate prosthesis provided. This was succeeded later by a permanent gutta-percha jaw with teeth,

<sup>1</sup> Beiträge zur klin. Chir., 1908, Band lvii, S. 193.

five weeks after operation. The specimen revealed numerous cysts containing a serous fluid and solid areas apparently springing from the alveolar portions of the jaw. Several teeth were embedded in the wall.

**ODONTOMA.** Cousins<sup>1</sup> reports a compound follicular odontoma in which more than 100 denticles were removed from the lower jaw in several operations, the treatment extending over eleven years. These tumors usually appear in the molar and bicuspid regions of either jaw. Cousins believes they can be removed from within the mouth cavity if small, but if large, an external incision is necessary. As enucleation of this growth is indicated care should be taken in tumors of the jaw not to remove the maxilla for a supposed sarcoma without excluding odontoma. Peripheral necrosis is sometimes seen after operation owing to the impeded circulation and nutrition of the bone and the depressed constitutional state of the patient.

**Cancer of the Lip.** Judd<sup>2</sup> discusses epithelioma of the lip and reports the result in 156 cases from Mayo's clinic. The upper lip was affected but three times. In 5 cases only were females affected; 61 per cent. occurred after the age of fifty, the youngest patient being twenty-one years of age. In only about 70 per cent. of the cases could they subsequently trace the after-results, which are, therefore, not of great value. Of 44 cases traced in which the glands were removed, the operation having been done over three years, all but 3 lived without recurrence, and 1 of the 3 was a recurring case at the time the radical operation was performed. In describing the technique, Judd emphasizes the importance of a "collar incision" with the convexity downward in order to avoid cutting the lower branches of the facial nerve. The dissection is commenced in the middle line, and after dissecting out the submental nodes, the submaxillary lymphatic nodes, and submaxillary salivary glands, should be removed in one block; the removal of the salivary glands apparently does not cause any inconvenience.

The hypoglossal nerves should, of course, be carefully preserved. A small stab drain is placed in the submaxillary spaces, and after suturing the platysma the skin is closed by a subcuticular stitch. The growth is then removed from the lip by an incision not closer than one-half inch to the growth at any point. Judd states that they have never seen recurrence in the lymph vessels between the growth and the nodes.

*Trichinous infection in carcinomatous tissues* is quite rare and Babler's<sup>3</sup> case is of interest not only because of the findings of trichinae in a carcinoma of the lip, but also in demonstrating the danger of permitting apparently harmless warts to grow. The patient, aged sixty-two years, for twenty-five years had had a small wart on his lower lip near

<sup>1</sup> British Medical Journal, 1908, i, p. 1353.

<sup>2</sup> Old Dominion Journal of Medicine and Surgery, November, 1908, p. 399.

<sup>3</sup> Annals of Surgery, March, 1908, p. 332.



the middle, which suddenly began to increase in size a month or two before observation. While it was thought that the swollen condition of the lip was not entirely due to the epitheliomatous growth, yet an excision was advised and performed. Microscopic examination revealed the carcinomatous nature of the lesion, and also demonstrated the presence of trichinæ within the muscular tissues surrounded by a capsule and by a round-cell infiltration.

**The Mouth.** CLEFT PALATE. Brown<sup>1</sup> believes that in approximately 10 per cent. of these deformities there will be a history of direct heredity in the family on one side or the other in which there have been persons affected by either harelip or cleft palate, or both. He objects to forcible methods of cure in early infancy, which, by altering the shape of the dental arch and arresting the development of the maxillary bones, interferes with phonation. Imperfections in the development of the nose, shortening of the hard palate or velum, and deformed lips due to faulty operative methods are too frequently observed. In all cases operation should be followed by speech training preferably by the use of the voice in singing.

The principal objections usually urged against operating upon infants are their intolerance of loss of blood; secondly, the small size of the structures which makes operation difficult; thirdly, septic infections which may cause gangrene; and, fourthly, hypothetical interference with the development of the jaw (Ehrmann).

McGraw,<sup>2</sup> in an excellent review of the unsettled questions in the treatment of harelip and cleft palate, believes that the relief of constant irritation and catarrhal inflammation of the nasal mucous membrane aids so enormously in the recuperation of sickly infants that the advantages of early operation more than counterbalance the objections. As to the third cause, he believes that the number of deaths is very small and especially when the Brophy operation is performed. In regard to infection with the production of meningitis he does not believe it is possible to so injure the connecting bones as to produce this condition. McGraw states: "That, in general, the milder complicated cases of harelip may be operated on if a child has passed the third week of life; the severer cases after the second or third month. When, however, it is complicated with a cleft palate the surgeon will have to consider the sequence in which he would perform the many operations which may be required to remedy the defect." As regards technique, McGraw always uses horsehair to avoid scars, prevents hemorrhage by operating slowly, and by lowering the head prevents the blood from being swallowed. In the technique of cleft-palate operations, he uses Fillebrown's gag, prefers silver or bronze or silkworm-gut sutures to relieve tension, although iron-dyed silk may be used to secure

<sup>1</sup> Journal of the American Medical Association, 1908, vol. 1, p. 342.

<sup>2</sup> Detroit Medical Journal, January, 1908.

union of the cut edges; he is particularly careful in the after-treatment of his patients, frequently douching and cleansing the palate.

Ferguson<sup>1</sup> objects to the Brophy operation on account of its high mortality, and prefers his own method when the roof of the mouth is like a Gothic arch and the Davies-Colley operation in most other cases. He advocates the repair of a harelip soon after birth, the same day if possible, if all conditions permit of operation; but for the cleft palate, while all defects should be closed before the child begins to talk the operation is so serious that it should seldom be performed at the same time as the repair of the harelip.

**CANCER OF THE MOUTH AND TONGUE.** Warren<sup>2</sup> presents a very interesting study of 172 consecutive cases from the records of the Massachusetts General Hospital from 1890 to 1904. Of these, 98 involved the tongue and floor of the mouth, 40 the mucous membrane involving the lower jaw, 14 the mucous membrane involving the upper jaw, 11 the tonsil and soft palate, and 9 the mucous membrane of the cheek.

Fifty, or 29 per cent., were inoperable when admitted and 10 others refused operation; 18 per cent. of those operated upon died as a result of the operation, the mortality varying from 5 per cent. in the intra-buccal operations to 30 to 35 per cent. in those operations involving division or resection of the lower jaw. Death was, as a rule, attributed to shock, sepsis, or bronchopneumonia.

Sixteen cases were free from recurrence three years or over after operation, the best results being obtained in cancer of the tongue and mucous membrane involving the lower jaw. Cancer involving the upper jaw did not cause any mortality from the operation, yet of 10 cases operated upon recurrence took place in all. While the neck was not dissected out in any of the cases, Warren observes that 8 of the 10 local recurrences made it evident that the primary tumor was not completely extirpated.

The relation of the lymphatic system to the primary growth is the most important anatomical consideration in operations for cancer of the mouth and tongue. Cancer of the tongue appears to involve the upper deep cervical glands primarily, whereas cancer of the floor of the mouth first attacks the submaxillary group. Cancer at the tip of the tongue, or of the floor of the mouth, near the frenum passes first to the submental and sublingual group.

*Etiology.* Leukoplakia, chronic ulcers, cracks and fissures as factors undoubtedly favor malignant growths. Inflammation of the gum due to chronic pyorrhea with constant discharge of pus from around dead roots and carious teeth may give rise to thickening and breaking down of the epithelium, and the development of cancer of the mucous membrane of the alveolar process.

Warren agrees with Butlin that the influence of syphilis is an indirect

<sup>1</sup> *Journal of the American Medical Association*, 1908, vol. 1, p. 1517.

<sup>2</sup> *Annals of Surgery*, October, 1908, p. 481.



rather than a direct cause, because it tends to produce conditions of the tongue which predispose to cancer. He also believes that the use of tobacco is of but little importance. He emphasizes the necessity of teaching the public, especially dentists, hygiene of the mouth and teeth and the necessity of recognizing cancer at an early stage. In this connection it might be well to mention that Landouzy<sup>1</sup> believes that buccal leukoplakia is much more common than is generally supposed. He thinks that syphilis, much more than the use of tobacco, is a predisposing cause, being discovered in the history of nearly every case.

Warren concludes that "the modern operative treatment of cancer of the mouth and tongue involves: (a) Preliminary treatment of the cavity of the mouth; (b) protection of the respiratory tract by drugs, and by intubation of the pharynx, or laryngotomy or by position; (c) removal of the primary lesion with a margin of one inch, if possible, of healthy tissue; (d) block dissection of the lymphatic bearing tissues of the anterior cervical triangle, on one or both sides as a routine measure; (e) a lower operative mortality may be obtained by performing the block dissection of the neck as a secondary operation about two weeks after the excision of the primary disease; (f) the intrabuccal operation is inadequate to reach the entire operation field, and should be supplemented by a dissection of one or both anterior cervical triangles; (g) the submaxillary route, although it permits a block dissection, does not give as free access to the diseased tissues as is demanded in an operation for cancer; (h) the route through the jaw exposes the whole field of operation, and enables the surgeon to act as if operating upon the surfaces of the body, but division of the lower jaw as at present performed adds greatly to the surgical risk."

The results of the 112 operations at the Massachusetts General Hospital may be tabulated as follows:

	Cases.	Deaths.	Cures.
Tongue and floor of mouth . . . . .	62	8	9
Lower jaw . . . . .	28	10	5
Upper jaw . . . . .	10	0	0
Cheek . . . . .	8	2	1
Tonsil and palate . . . . .	4	0	1

A certain number of these operations were undertaken only as palliative measures, but, on the other hand, in 10 of the 16 cases simple excision of the primary growth was the only operation done. Warren, therefore, judges that it was only the earliest and most favorable cases in which a cure resulted.

Paul<sup>2</sup> records "three years' experience of Butlin's operation for cancer of the tongue." As will be remembered, this operation consists in the

<sup>1</sup> Bull. de l'Acad. de Méd., 1908, vol. lxxii, p. 715.

<sup>2</sup> British Medical Journal, 1908, p. 1355.

removal of the primary growth and a complete dissection of the entire anterior triangle of the mouth from the jaw to the clavicle, leaving nothing but the bare surface of the great vessels and muscles. He tabulates his results for the years 1905, 1906, and 1907: Total number of cases, 35: lip, 3; cheek, 3; palate, 1; tongue, 28.

*Favorable Cases.* Free from recurrence, 9; died from operation, 1; no report, 1.

*Advanced Cases.* Free from recurrence, 8; has recurrence, 1; died from the disease, 5; no report, 1.

*Bone Cases.* Known to be free from recurrence, 0; have recurrence, 4; died from operation, 1; died from the disease, 2.

*Totals.* Free, 17; recurred, 5; died of disease, 7; no subsequent report, 4. Total, 35.

*Duration Free* (in years and months). 3.4, 3.0, 2.11, 2.11, 2.10, 2.5, 2.2, 1.10, 1.9, 1.7, 1.3, 1.2, 1.1, 1.0, 0.5, 0.4, 0.4. Total, 17.

Paul states that in his experience cancer (epithelioma) attacks the mouth in this order: (1) The side of the tongue; (2) anterior pillar of the fauces; (3) floor of the mouth about the orifices of the salivary ducts; (4) cheeks and lips; (5) tip, dorsum, and epiglottis; (6) palate and top of pharynx.

In regard to the technique of the operation he does not believe that the tongue can be properly removed by a purely intra-oral operation, except when the growth is in a very early stage. He removes the primary growth first and waits for two, or at most three, weeks before operating upon the neck, except in those tumors involving the fauces, where the submaxillary and carotid regions must be cleared out with the primary growth.

He cautions against leaving the deep lymphatic nodes between the geniohyoglossus muscles, and states that in removing the upper carotid nodes the parotid salivary gland must be cut. By so doing the cervical branch of the facial nerve will be cut paralyzing the corner of the lip and permitting the escape of the saliva. When there are infected glands on the jugular vein this should be excised and the dissection carried into the posterior triangle.

Fells<sup>1</sup> presents some interesting statistics relative to cancer of the mouth in Southern India in which it is shown that of 377 cases of carcinoma in 31,845 admissions, 346, or 91.5 per cent., were connected with the buccal cavity. Of these, in 83.2 per cent. the disease began in the mucous membrane of the cheek close to the lower jaw, only 7.5 per cent. were on the lip, and 9.3 per cent. in the tongue. He ascribes this frequency to the fact that practically every native chews a mixture of betel leaf, tobacco, areca-nut, and slaked lime, and rests the quid against the cheek.

<sup>1</sup> British Medical Journal, June 6, 1908, p. 1357.



TUBERCULOSIS OF THE MOUTH is discussed by Levy,<sup>1</sup> who reports 8 cases. He believes that "infection may descend through the lymphatic system to the bronchial glands, invade surrounding structures and be carried by the blood current to such parts as the tongue, the lips, the gums, or the hard palate, and that additional local irritation or trauma, however slight, may determine the outward manifestation of tuberculosis in these regions."

In the cases reported pulmonary involvement was present in all, and the local lesions were seen on the gums, palate, tonsils, larynx, and in two cases on the tongue.

Levy believes that when the soft palate, mouth, tonsils, anterior pillars, and tongue are involved, the prognosis of the local lesion is unfavorable and a general decline with an early and fatal termination may be predicted.

DEEP ABSCESS IN THE TONGUE. The posterior portion of the tongue is occasionally the seat of deep suppuration, which is not only difficult to localize but is attended with much danger when an attempt is made to perform an incision from within the mouth cavity. This may arise from infected ulcers caused by a broken tooth, foreign bodies, etc., or by extension from neighboring phlegmonous areas, especially in the tonsillar region. Brunk<sup>2</sup> discusses this lesion and describes the etiology, symptoms, and treatment. The importance of early recognition and prompt treatment lies in the danger of edema of the larynx. The pain suffered by the patient is great, and, as palpation from within the mouth reveals merely a hard, infiltrated muscle, the location of the seat of the abscess is difficult to detect. For these reasons and because of the danger of hemorrhage, Brunk objects to the incision being made through the mouth and prefers Killian's method, whereby the abscess is approached from beneath the jaw. In two cases which he reports in detail, the hypoglossus muscle was located through a small incision after reflecting the submaxillary gland and hypoglossal nerve upward, and by separating its fibers the abscess was readily evacuated and drained. He suggests that if the abscess pursues a lateral direction between the hyoglossus and genioglossus muscles, it may result in Ludwig's angina.

RANULA is generally believed to be due to dilatation of Wharton's duct from stenosis, or from obstruction by foreign bodies. Gilmar<sup>3</sup> believes that this view is fallacious, and that this condition is due either to cystic degeneration of parts of the sublingual gland separated from the main organ, cysts originating in the gland tissues, or cysts originating in the mucous glands in the floor of the mouth. In the discussion upon

<sup>1</sup> Laryngoscope, December, 1907, p. 905.

<sup>2</sup> Deut. med. Woch., June 4, 1908, p. 1013.

<sup>3</sup> Journal of the American Medical Association, 1908, vol. li, p. 993.

this paper H. A. Potts defined ranula as "a transparent, thin-walled, chronic tumor developing in the floor of the mouth, microscopic sections of which show either the whole or parts of the sublingual, or submaxillary gland, plastered over the walls of the cyst."

THE TONSILS AS PORTALS OF ENTRY of infectious diseases has been a fertile theme for many writers, and the bacteria associated with many of the infectious diseases have been believed to enter the body by way of the tonsillar ring. As long ago as 1804 Heberden associated angina with acute articular rheumatism, and Thompson goes so far as to state that 30 per cent. of the cases of acute articular rheumatism are preceded by angina. Rosenheim<sup>1</sup> reports a bacteriological study of the tonsils removed from seven patients suffering from acute articular rheumatism. In 5 of these the tonsils were definitely hypertrophied; in 2 they were not. In 4, a streptococcus and staphylococcus, in 1 streptococci and other cocci, in 1 staphylococci and a few bacilli were found. All of these patients left the hospital a short time after the removal of the tonsils, either well or much improved.

In one case of arthritis deformans streptococci were found in pure culture. This case was treated with streptococcus vaccine and improved markedly.

PHARYNGEAL SUPPURATION. In an excellent paper Fitzwilliams<sup>2</sup> calls attention to the inexact nomenclature adopted by various writers upon this condition. The term retropharyngeal abscess is often applied to a collection of pus lying superficial to the pharyngeal aponeurosis under the mucous membrane, to an abscess in the retropharyngeal space, and even to a cold abscess lying behind the prevertebral fascia. He believes that such abscesses differ from each other in pathology, bacteriology, and method of treatment, quite as widely as an appendicular abscess differs from one in the psoas muscle.

Abscesses in the region of the pharynx are divided into the following groups:

1. *Quinsy* or suppuration in or around the tonsil. In the latter situation the abscess lies chiefly in the soft palate, and either palatal or peritonsillar abscess is a better term to employ. The pus is always superficial to the pharyngeal aponeurosis. In treating this condition Fitzwilliams sometimes removes the tonsil with a large-sized guillotine, rapidly removes the pus with swabs, and with the finger removes any tonsillar tissue that remains.

2. *Retropharyngeal abscess* is found wholly outside the pharyngeal walls between the buccopharyngeal aponeurosis and the prevertebral layer of the deep cervical fascia. It is usually due to infection of hypertrophied lymphoid tissue of the pharynx, but sometimes follows in the wake of the exanthemas, etc. The swelling is almost invariably lateral, owing

<sup>1</sup> Bulletin of the Johns Hopkins Hospital, 1908, vol. xix, p. 338.

<sup>2</sup> Practitioner, December, 1907, p. 811.



to the position of the lymphatics and the lack of space in the median line. In the treatment of this variety Fitzwilliams strongly urges the importance of early incision, thereby preventing dysphagia and dyspnea, which may threaten or even terminate life. The oft-quoted picture of small infants "drowning in their own pus" from the bursting of a large abscess during sleep, is stated to be so rare that only two authentic cases are on record.

3. *Postadenoid Abscess.* This lies between the lymphoid tissue in the mucous membrane and the pharyngeal aponeurosis, and usually above the level of the soft palate. It is caused by an acute catarrh setting up a septic infection of secretion which has accumulated in the deep furrows of the lymphoid tissue. It is practically confined to children and is rarely of any great size, and is diagnosticated by the symptoms and examination of the nasopharynx by a mirror. Treatment is by incision.

4. *Suppuration or caseation in the deep cervical nodes* lying in relation to the carotid sheath may extend inward to the lateral pharyngeal wall. It is usually traced to infection on the scalp, face, or neck or occasionally from the throat. These abscesses should always be incised from the outside, and not evacuated from the mouth. Depending upon the position of the nodes affected the abscess will point in front of or behind the sternomastoid muscle. If it lies directly under the muscle the lateral wall of the pharynx may be pushed in and a retropharyngeal abscess simulated, but only rarely is the faucial space encroached upon to the same extent.

5. *Spinal caries* may cause a cold abscess lying behind the prevertebral layer of the deep cervical fascia, which bulges forward and encroaches on the pharyngeal space. The history and symptoms differentiate the affection and the abscess should be opened from the outside under the strictest aseptic precautions, the pus evacuated as in a psoas abscess and the wound carefully closed. One must be particularly careful to correctly diagnosticate this condition from other forms of pharyngeal suppuration, because if opened from within the mouth a mixed infection would lead to serious consequences.

**SARCOMA OF THE TONSIL.** Goodale<sup>1</sup> reports the case of a woman, aged thirty-five years, who suffered from a rapidly growing lymphosarcoma of the tonsil. She was treated by injections of turpentine into the legs, with the idea of producing subcutaneous suppuration and also by injections of staphylococcus aureus vaccine. Two months later the growth had entirely disappeared. Goodale believes that the cure was effected by the vaccine because the turpentine abscesses did not appear until recovery was almost completed.

<sup>1</sup> Boston Medical and Surgical Journal, September 24, 1908, p. 409.

## THE NECK.

**Dislocation of Cervical Vertebrae.** Traumatic injuries to the cervical cord are almost invariably fatal, but Lofton<sup>1</sup> reports the case of a patient who was caught around the neck by the chain of a steam shovel and the neck dislocated, the ventral arch of the atlas resting on the odontoid process of the axis. Complete motor and sensory paralysis from the chin downward (except the right index finger) was noted, the respirations being 14, pulse 58. The luxation was reduced and four days later motion began to return at first in the left lower extremity and right forearm. Five and one-half months later the patient had entirely recovered, except for atrophy of the left deltoid.

**Torticollis.** Broca<sup>2</sup> discusses the inflammatory forms of torticollis, and states that two-thirds of these are due to forms of interstitial myositis and one-third due to injury from forceps during delivery. A few cases, however, remain unexplained and for these he assigns certain lesions as being the cause.

He considers cervical adenitis as an etiological factor in the production of torticollis, even if not suppurative. The head inclines toward the affected side partly due to the inflammatory reaction and partly to relieve tension. With the subsidence of the adenitis the torticollis is usually recovered from, although it may persist either as a result of habit or because of inflammatory induration of the muscle.

Acute mastoiditis not only acts as a cause for torticollis, but the presence of the latter is considered by otologists as an indication for a mastoid operation. In the beginning, however, the deformity is usually hysterical. He has observed a patient with torticollis where a diagnosis from high Potts' disease was very difficult, but if the head of the patient was further inclined toward the affected side the head could be gently rotated in all directions without any limitation of motion or pain. It is not only the muscle that is affected in the cervical spondylitis, but all of the other tissues of the neck as well. In case of doubt Broca would advise extension and counterextension for a time, in an endeavor to clear up the symptoms. Treatment is usually successful.

Rowlands<sup>3</sup> urges lengthening of the sternomastoid for real and chronic shortening of that muscle in preference to division, and believes that its good results are less dependent upon laborious and intelligent after-treatment. He selects the lower end of the muscle in order to not damage the spinal accessory or second cervical nerves, to make the scar less conspicuous, and to be able to deviate the axis of the muscle if necessary. The sternal tendon is detached from the bone and from the clavicular

<sup>1</sup> New York Medical Journal, 1908, vol. lxxxvii, p. 736.

<sup>2</sup> Presse Med., September 12, 1908, p. 585.

<sup>3</sup> Practitioner, September, 1906, p. 401.



fibers and the latter divided obliquely upward and backward. The stumps of the two heads of the sternomastoid are then sewed together with catgut. The fascia covering the scalenes and the levator anguli scapulæ requires division, and the anterior fibers of the trapezius may need stretching. The head is bandaged in the overcorrected position and maintained therein by a simple apparatus made of webbing for six months. Active and passive movements should be carried out systematically twice daily from the first week.

SPASMODIC TORTICOLLIS. Division of contracted muscles and stretching or resecting portions of the spinal accessory nerve are the usual procedures advised for this affection. Such treatment is invariably followed by a recurrence of the spasm, often in a few days after the operation, because while the sternomastoid and part of the trapezius may be thrown out of action the posterior cervical muscles are unaffected. In order to control the spasm of these muscles the posterior primary divisions of the upper cervical nerves must be sectioned—a difficult and tedious operation. Most operators follow Keen's technique, which requires division of the trapezius, splenius capitis, and complexus muscles. There is much oozing of blood and an indifferent exposure of the nerves.

Kennedy<sup>1</sup> proposes a new procedure which only divides the splenius capitis. The incision extends vertically downward midway between the ear and the occipital protuberance, from a point one-half inch above the superior curved line. The posterior edge of the sternomastoid is defined and the splenius exposed, care being taken not to wound the superficial cervical vessels or the spinal accessory nerve. The splenius is then divided in the direction of the wound, exposing the complexus and trachelomastoid muscles, and above, passing between the two, are the occipital vessels. The upper two slips of origin of the complexus are then detached from the third and fourth cervical articular processes and the muscle retracted inward. The great occipital is then seen piercing the complexus about the level of the lower edge of the lobe of the ear, the lesser occipital entering slightly above. The latter slender nerve is best located by tracing upward a communicating branch, passing across the inferior oblique to the first division, which lies between the vertebral artery and the arch of the atlas. The first nerve should be sectioned just proximal to its branches, and the others near their point of separation from the anterior primary division.

As this operation causes permanent paralysis of the muscles and loss of sensation in the neck, Kennedy in one mild case of three months' duration, performed section of the nerves as outlined, followed by immediate suture. The result of this procedure is that the violent spasm is abolished, the affected muscles degenerate, and in the course of some

<sup>1</sup> British Medical Journal, October 3, 1908, p. 986.

weeks, after the nerves have regenerated, as indicated by the gradually returning sensation, the muscles begin to get built up again, and shortly begin to resume their functions.

**Ludwig's Angina.** In 1836 Ludwig described a peculiar condition characterized by a rapidly spreading infectious swelling of the neck often resulting fatally and which has since been designated by his name. Thomas<sup>1</sup> contributes an excellent anatomical, clinical, and statistical study of this affection and reports two cases observed in his practice. He concludes that the condition known as "Ludwig's angina" is a rapidly spreading cellulitis beginning in the region of the submaxillary gland as a perilymphadenitis, and extending to the floor of the mouth and pharynx. The primary focus is usually some neighboring surface lesion, as a carious tooth, tonsillitis, or ulcer in the mouth. The infecting organism is usually the streptococcus alone or mixed with other organisms, as the staphylococcus, pneumococcus or bacillus of malignant edema; but it may be the staphylococcus alone or any organism capable of producing a rapidly spreading cellulitis.

Death results from invasion of the larynx in most cases. In a considerable number the lungs are also involved. The associated septic intoxication is probably no more severe than that which results from streptococcus infections of the same grade in other parts of the body.

The opening in the muscular buccopharyngeal wall, through which the submaxillary salivary gland projects into the floor of the mouth, is the path by which the submaxillary infection invades the mouth and pharynx.

The rapidly spreading cellulitis in the floor of the mouth is a menace to the life of the patient, as the anatomical conditions there favor the early involvement of the larynx.

It is this invasion of the floor of the mouth and the pharynx which determines the alarming symptoms characteristic of Ludwig's angina. It is evident, therefore, that a cellulitis of a given grade of severity, beginning in the floor of the mouth, is more dangerous than one beginning in the submaxillary fossa, since the larynx will be more early and surely invaded. The opportunities for recognizing and checking the danger are, therefore, correspondingly lessened. For the same reasons the most dangerous cases are those in which the phlegmonous process begins in the larynx or in the pharynx, the danger being greatly increased in these because, even if recognized immediately, the parts cannot be inspected or properly incised and disinfected.

The pathological changes occurring in the infected area do not differ materially from those which may be expected from any severe pyogenic infection occurring under similar anatomical conditions. The proximity of the alimentary tract explains the frequency of gas and putrescence

<sup>1</sup> University of Pennsylvania Medical Bulletin, March, 1908, p. 2.



in many cases in which gangrene was not reported; while the intensity of the inflammatory process and the compression of the inflammatory material inside the jaw and under the tongue accounts for the frequency of gangrene.

The condition occurs with sufficient frequency, and is sufficiently constant in its clinical course to deserve a place as a morbid entity. No name is at the same time so brief and so comprehensive as that of Ludwig's angina. Those cases in which the cellulitis originates in the floor of the mouth may be included with advantage among the Ludwig's anginas. Those in which the phlegmonous process begins in the throat should form a separate group, from the standpoint of prognosis and treatment.

Modern surgical treatment has reduced considerably the number of cases in which irregular septic temperature, profuse sweats, delirium, and a progressively profound typhoid state occurs. Incisions in the floor of the mouth may be advisable in a few cases for the relief of excessive swelling, but they have rarely given satisfactory results.

The median suprahyoid incision, while the safest of the external incisions, does not expose the usual primary seat of infection, and should not be selected except to evacuate an evident purulent collection in the submental region. The submaxillary incision, *i. e.*, over the submaxillary triangle, and parallel with the lower border of the jaw, will probably locate an existing pus collection in the greater number of cases. If frank suppuration is not found before, the mylohyoid muscles should be divided and the sublingual tissues exposed.

On account of the added irritation of a general anesthetic to an already dangerously inflamed larynx, local anesthesia will probably prove to be the more valuable means of controlling pain during the making of the incision.

Price<sup>1</sup> reports 5 cases of Ludwig's angina with one death. After studying the mode of transmission of the infection in his cases he believes that in three the primary focus was due to dental caries, the inflammation involving the periosteum of the lower jaw and thence invading all of the surrounding tissues by direct continuity. In the other cases the primary focus was in the pharynx and tonsil and the infection was probably carried to the neck by the lymphatics.

Pratt<sup>2</sup> reports four cases of Ludwig's angina with one death and from his observations, both clinically and on the cadaver, agrees with the findings and deductions of Thomas. In two of his cases the condition was due to an attack of tonsillitis, and in one other it may have been due to either tonsillitis or ulceration about a molar tooth.

**Cervical Ribs.** Cervical ribs, lumbar ribs, etc., are considered as evidence of the relation of man to other animals possessed of a backbone.

<sup>1</sup> *Annals of Surgery*, November, 1908, p. 649.

<sup>2</sup> *Illinois Medical Journal*, 1908, vol. xiv, p. 462.

Roberts reports a case observed in a woman, aged thirty-two years, supposed to be suffering from an aneurysm at the base of the neck on the right side. There was no atrophy or paresis of the right hand or pain in the neck. Palpation disclosed a cervical rib on both sides confirmed by *x*-rays. As no inconvenience was suffered from it, operation was not advised. Roberts discusses the anatomical varieties, symptoms and treatment of surgical rib, but does not offer anything new or different from the papers of Keen and others, mentioned in previous issues of *PROGRESSIVE MEDICINE*. He does not advise subperiosteal resection, and under "palliative treatment" mentions the advantage of using the electrical current.

Arnold<sup>1</sup> records six instances of cervical ribs which were the direct cause of torticollis in five of the patients and of a pressure neuritis in one. He states that such neck deformity due to cervical rib may produce torticollis to either side, or caput obstipum anteriore, irrespective of the number of cervical ribs or the side on which they are situated.

**Tuberculosis of Cervical Lymph Nodes.** Willy Meyer,<sup>2</sup> whose enthusiasm for the artificial hyperemia of Bier is well known, proposes the use of an elastic band to be worn about the neck of patients suffering from tuberculosis of the cervical nodes. The band is worn for eleven out of every twelve hours and should be just sufficiently tight to compress the deep jugular veins without causing annoyance of any kind to the patient. Fluctuation should be carefully watched for and may be hastened by the application of a Priessnitz dressing. When it appears a small incision is made, the pus evacuated and suction treatment begun by a Bier cup four to six hours later and used once daily for a period of forty-five minutes.

Parker Sims<sup>3</sup> discusses the surgical treatment of tuberculous nodes of the neck. He claims that complete obliteration cannot be assured by the so-called radical operation; that this is more likely than conservative treatment to cause dissemination of the disease; that it gives the greatest possible scar; that it does not conserve the patient's strength more than other procedures since tuberculous patients withstand operation poorly, and that it does not insure prompt cure without recurrence. While the radical operation must be resorted to in some cases, the large majority of patients may be safely and successfully treated by hygienic measures, as in other tuberculous affections, combined with slight operations which aid in effecting a spontaneous cure. If the enlarged nodes are apparently not broken down, the skin of the region should be thoroughly anointed every night with a 10 per cent. ointment of ichthyol, and removed in the morning with soap and water. If one or two of the nodes are decidedly larger than the rest, persistently remain so, and show a tendency to increase

<sup>1</sup> Yale Medical Journal, 1908, vol. xv, p. 97.

<sup>2</sup> Medical Record, 1908, vol. lxxiv, p. 865.

<sup>3</sup> Pediatrics, February, 1908.



and not to diminish, it may be well to make a small incision and remove them. If any of the nodes show evidence of having broken down either by cheesy degeneration or abscess formation, they should be opened before they have ruptured their capsules. Their cavities should be thoroughly curetted and kept open by a drain of gauze or rubber tissue for a few days, and then they should be treated with a 10 per cent. emulsion of iodoform in glycerin.

Pottenger<sup>1</sup> is also skeptical as to the value of surgical treatment and believes that the cure of tuberculosis of the lymphatic nodes, the same as the cure of tuberculosis wherever found, depends upon the specific immunizing properties of the blood brought to play upon the infected areas.

**NERVE LESIONS FOLLOWING EXTIRPATION OF CERVICAL NODES.** Westergaard<sup>2</sup> describes two cases and discusses the literature of this annoying accident. In each of the cases the spinal accessory was injured with resulting paresis of the trapezius muscle, and pain, areas of anesthesia and symptoms suggesting arthritis of the shoulder-joint. These were relieved by an apparatus worn to sustain the shoulder. I have several times seen paresis of the lowermost filament of the facial nerve with disturbance of the corner of the mouth, and once a hemiatrophy of the tongue as a result of extensive dissections for advanced tuberculous adenitis. In most of the cases where injury to the spinal accessory has been sustained there are no resultant symptoms except drooping of the shoulder.

**The Interscapular Gland.** Bonnot<sup>3</sup> describes a structure in the neck which is but little known and yet of some importance from the surgical aspect. The gland is a paired organ, very irregular in shape, but definite in outline, situated on the shoulder and side of the neck between the superior border of the scapula and clavicle, with a large process extending up to the mastoid process of the temporal bone. The gland can be divided into a body, and a mastoid, clavicular glenoid and scapular processes. The gland varies in size with the condition of the individual. In the well-nourished it is very pronounced, the lobules are full and rounded out, due to the fat in the connective tissue and gland tissue proper. In poorly nourished persons it is much reduced in size, but is constant and its parts distinct. Bonnot believes that the interscapular gland originates from the wall of the primitive jugular vein, and that it is the homologue of the so-called hibernating gland in the rodents. It is believed to serve, under certain conditions, as a storehouse for fat, as a scavenger for the red blood cells, and as a blood-forming organ. Scattered in the midst of this gland are the gland nodes which may be hemolymph or lymph nodes. I have often been struck with the diffi-

<sup>1</sup> Pediatrics, February, 1908.

<sup>2</sup> Hospitalstidende, February 26, 1908.

<sup>3</sup> Journal of Anatomy and Physiology, 1908, vol. xliii, p. 43

culty, in dissecting the neck, which the lymph nodes offer to their removal when it is necessary to cross under the sternomastoid muscle, and have often been uncertain whether I have made a complete dissection or not. Bonnot's descriptions of the glenoid and scapular processes of this gland clearly explain the reason, and may also explain why in lymphosarcoma and Hodgkin's disease the number of nodules or enlarged nodes appear to be greatly in excess, numerically, of the normal number of nodes in the neck. He also raises the question as to whether or not this organ is different from the so-called dark fat in the axilla, inguinal and prevertebral regions.

**Cysts and Fistula of the Thyroglossal Duct.** Erheim<sup>1</sup> discusses these lesions under two headings: first, those tumors or cysts at the base of the tongue from persistence of the upper portion of the duct, and, second, the median cysts and fistulas. He reports 8 cases in all: 4 of median fistula, 2 median cysts, and 2 cysts at the base of the tongue.

The median cysts and fistulas are the more common and he considers that while the *anlage* is congenital the anomalies usually do not appear for some years. In order to make an accurate diagnosis, the clinical and operative findings should be confirmed by a microscopic examination, which will reveal the cylindrical epithelium lining the cavity or duct.

Erdheim noted, however, that after making serial sections the cylindrical epithelial lining alternated with squamous epithelium and that the latter was not confined, as has been stated by König, to the upper portion of the duct. In the wall of the cysts and fistulas mucous glands and small mucous cysts are invariably present, explaining the common finding of mucus in the contents. The abundance of lymphoid tissue found beneath the epithelial lining is important from the practical standpoint, because such tissues are prone to infection and inflammation and many of the cysts come to operation because of suppuration. In 3 of the 6 neck cases Erdheim found thyroid tissue in close proximity to the persisting duct. In operating upon these conditions a radical and complete removal of the fistulous tract with extirpation of all mucous glands, cysts, and thyroid tissue should be performed in order to prevent recurrence. It is necessary to resect the hyoid bone in order to extirpate the entire fistula, and in one case of Erdheim's, where the dissection was only carried to this bone, a recurrence occurred necessitating a second operation.

Wegłowski<sup>2</sup> investigated the origin of these fistulas, examining 36 human embryos, 92 children, and 25 adult cadavers. He reached the following conclusions:

In 30 per cent. of the bodies examined there was an incomplete development of the median portion of the thyroid gland, with a primitive

<sup>1</sup> Arch. f. klin. Chir., 1908, Band lxxxv, S. 212

<sup>2</sup> Zent. f. Chir., 1908, xxxv, 289.



passage to the base of the tongue, either in the form of a separated small portion of the gland, a canal, or a cyst. These remains are usually not perceptible, but under favorable circumstances may lead to fistulas, cysts, or aberrant goitres. The complicated microscopic structure of the fistulas is due to pulling downward of isolated elements from the tongue by the developing median portion of the thyroid gland. Lateral fistulas have a similar origin, being considered to arise not from the branchial clefts as is usually supposed, but from the remains of the thymus and thyroid glands. Weglowski states that the branchial apparatus should be limited to the region of the face and not to the neck, the hyoid bone determining the lower border. Neither the arches nor clefts can project themselves downward, and, therefore, remnants of them cannot be found in the neck.

Hultgen<sup>1</sup> describes a cyst of a persistent thyroglossal duct containing sebaceous material, and which was of very rapid growth and large in size.

The pedicle was attached to the tongue at the exact location of the fetal foramen cecum.

Flint<sup>2</sup> reports a lateral fistula in the neck, of congenital origin and arising from the first branchial cleft. The patient was a male, aged twenty-one years, who had had a swelling on the right side of the neck ever since a small child, causing no symptoms until four years before observation, when it increased in size and opened just above the clavicle. At operation a pear-shaped mass was found and was seen to extend upward and forward underneath the sternomastoid until about one and one-half inches below the base of the skull, where it terminated in a cartilaginous column.

Microscopic examinations revealed the presence of a lining membrane of stratified squamous epithelium, much fibrous tissue, sebaceous glands, thyroid tissue, and cartilage.

**Cystic Tumors in the Neck.** Estor and Massaban<sup>3</sup> conclude that:

1. There exist in the neck multilocular cysts of complex structure and exhibiting many of the structures of the ectoderm or mesoderm in their lining, or entering into the construction of their stroma.

2. These tumors may be separated from the cystic thyroid tumors of Berger.<sup>4</sup>

3. They have interesting relations with the serous multilocular cysts of children which are probably lymphangiomatous in origin in most cases, although such origin has not been definitely decided. Some of the complex tumors contain tissue characteristic of lymphangioma in some of their areas, which has lead some writers to group both in the same class.

<sup>1</sup> Surgery, Gynecology, and Obstetrics, September, 1908, p. 357.

<sup>2</sup> Annals of Surgery, August, 1908, p. 165.

<sup>3</sup> Revue de Chir., September 10, 1908, p. 341.

<sup>4</sup> Congress de Chir., 1897.

4. The genesis of these multilocular cysts cannot be explained on the ground that they came from branchiogenic remains.

5. Finally, they believe that such cysts arise from proliferation of "rests" of many embryonic elements, which may also produce true teratomas, mixed tumors, and dermoid cysts. A better understanding of embryonic evolution is required for a clearer elucidation of the origin of these cysts.

**Tumors of Lateral Aberrant Thyroid Tissue.** McGlannan<sup>1</sup> reports four instances of this rare anomaly, Schrager<sup>2</sup> having collected but 16 cases in 1906. These tumors may simulate any of the solid or cystic forms of goitre and are due to the separation of islands of epithelium by the pressure of the great bloodvessels and neck muscles. In 1 of the cases reported, the patient was operated upon for supposed tuberculous lymphadenitis.

**The Thyroid Gland. GOITRE IN THE NEWBORN.** The occurrence of goitre in the newborn would seem to be somewhat of a rarity, but a recent article by Fabre and Thevenot<sup>3</sup> shows that somewhat over 130 cases have been reported. They believe that the number inadequately represents the frequency because from statistics collected at Berne they found 2333 cases of goitre in patients under two years of age, and believe that many of these must have been congenital. Heredity seems to play a prominent part in the etiology, as the mother was almost always and the father frequently goitrous. They do not admit, however, that a congenital anomaly exists, but believe that a veritable pathological lesion is present. The influence of transmitted infections, especially syphilis and tuberculosis, must be considered, but they are inclined to believe that toxins in the drinking water are transmitted by the mother to the fetus. They group the etiologic factors into persistence of the fetal circulation producing congestion, pressure exerted during delivery, and infections transmitted from the mother.

Pathologically, the diffuse parenchymatous goitre is most frequently seen, adenomas and cysts being very rare.

The symptoms are identical with those seen in the adult.

Dyspnea and cyanosis may be very intense or may be intermittent in character. Certain cystic swellings, especially those from the branchial clefts, must be diagnosticated. The prognosis is very grave, 60 per cent. ending fatally.

As to treatment, iodine or preparations of the thyroid may be given during the first few days after birth, cold compresses locally, and purgation to deplete the intestinal tract being also of more or less value. Tracheotomy is often practised to relieve intense dyspnea, but is dangerous, owing to the probability of pneumonia, and, therefore, a more

<sup>1</sup> Maryland Medical Journal, 1908, vol. li, p. 7.

<sup>2</sup> Surgery, Gynecology, and Obstetrics, 1906.

<sup>3</sup> Revue de Chir., June 10, 1908.



radical operation should be performed. They prefer, like many French surgeons, exothyropexy. If the mother is goitrous, prophylactic treatment should be practised, the drinking water changed, and preparations of the thyroid or iodine given to her during the confinement.

**ACCESSORY THYROID AT THE BASE OF THE TONGUE.** Perkins<sup>1</sup> reports an example of this abnormality, and tabulates 46 cases from the literature. He found that 40 were in females, and the ages varied from birth to seventy years, the greater portion occurring during the second and third decades. In 33 cases operative removal cured or caused great improvement; in 4 myxedema resulted. The operation was performed twenty-one times through the mouth and twelve times below the jaw. Death resulted in five instances, twice from suffocation, once from myxedema, and in two the patients died of intercurrent affections, the tumor being found at autopsy.

**INTRATRACHEAL GOITRE.** I have previously<sup>2</sup> referred to this rare variety of aberrant goitre in discussing Enderlen's paper, wherein only 15 cases could be collected from the literature.

Meerwein<sup>3</sup> reports another occurring in a girl, aged eighteen years, which was coincident with tuberculosis of the larynx. The tumor was upon the left wall of the trachea, extending from the level of the cricoid to the second tracheal ring, and was the size of a hazelnut. The tumor was removed and microscopically revealed the typical picture of thyroid tissue with colloid material in the acini. The writer states that the diagnosis of these tumors could be made on the youth of the patient, the long-continued tracheal obstruction, and laryngoscopic examination.

**ACUTE NON-SUPPURATIVE THYROIDITIS.** Dunger<sup>4</sup> reports seven cases of this rare affection observed at Schmaltz' clinic in Dresden during the last two years. The patients were all young women, the youngest being seventeen, the oldest thirty years of age. Two of the cases had a slight degree of hypertrophy before the inflammatory reaction was apparent. In six of the patients a recent attack of pleurisy, pneumonia, influenza, or apical catarrh, was considered as affording entrance for the infection.

The onset was marked by high fever, and twice by chills; the thyroid became enlarged and tender, and swallowing was painful. He considers the affection to follow catarrhal conditions in the air passages and intestinal canal in most cases, though occasionally it may be part of a rheumatic disorder. Treatment is based upon this etiology unless suppuration should ensue, when operation would be indicated. He warns against the use of iodine as being likely to induce exacerbations and recurrence. Finally, he believes that acute thyroiditis, unrecognized, may be the cause of apparently spontaneous exophthalmic goitre. He is led to state

<sup>1</sup> Laryngoscope, 1908, vol. xviii, p. 293.

<sup>2</sup> PROGRESSIVE MEDICINE, March, 1907.

<sup>3</sup> Deutsch. Zeit. f. Chir., 1908, Band xci, p. 334.

<sup>4</sup> Münchener med. Wochen., September, 1908, p. 1879.

this fact from a personal experience of four cases, and because of the similar effects following the internal administration of iodine.

Apelt<sup>1</sup> has also observed the classical symptoms of Basedow's disease develop about a year after the onset of an acute thyroiditis.

Schwerin<sup>2</sup> reports two cases of acute thyroiditis similar to those of Dunger, and does not believe the disease to be as rare as the list of reported cases would indicate.

Burke<sup>3</sup> described a recurring thyroiditis in a woman whose occupation required a constant turning of the head to the left to consult manuscript. The friction of the collar caused a recurring inflammation of the left lobe.

**BENIGN TUMORS OF THE THYROID GLAND.** G. P. Müller<sup>4</sup> discusses adenoma of the thyroid gland, and states that in the surgical laboratory of the University of Pennsylvania 39 thyroid tumors have been examined, of which 14 were simple colloid goitres, 10 adenomatous goitres, and 5 exophthalmic goitres. There were also 6 cancers, 3 sarcomas, and 1 cyst. Of the adenomas 5 were of the colloid, 3 of the fetal, and 2 of the papilliferous varieties.

Reverdin<sup>5</sup> discusses *intraglandular enucleation of goitres* by the Porta-Socin method. He recommends this operation particularly for cystic or solid benign encysted tumors. He states that it is contra-indicated if the growth is exceedingly vascular or if it is adherent to the enveloping gland from previous inflammation or methods of treatment. It is a fact not generally known that the majority of goitres are of that variety known as adenomatous goitres. In their glandular development they tend to approach the anterior surface of the gland, compressing the overlying thyroid tissue to such a degree that finally it becomes almost negative in quantity, and, when the capsule is incised, the operator comes immediately upon the adenoma.

Reverdin prefers the incision of Kocher, and after exposing the gland the operator should seek a space unoccupied by large vessels and should incise the thyroid substance vertically, layer by layer, until the tumor is reached. This causes some hemorrhage which is easily controlled, and the adenoma should then be separated by enucleation with the finger, the bleeding surfaces of the thyroid being seized, as they are freed, with hemostatic forceps. When the tumor is lifted from its bed the posterior wall of the cavity should be grasped with forceps and turned out, and the visible bleeding points secured. The cavity should then be tamponed for a few minutes to compress all oozing and then all bleeding points ligated, and drainage introduced emerging through the line of suture or through a counter opening. He believes that recurrence may occur if the operator overlooks the presence of additional adenomatous nodules, and he

<sup>1</sup> Münchener med. Wochen., October 1908, p. 2137.

<sup>2</sup> Ibid., p. 2138.

<sup>3</sup> Ibid., p. 2137.

<sup>4</sup> International Clinics, 1908, Series 18, vol. iii. p. 3.

<sup>5</sup> Surg., Gynec., and Obstet., March, 1908, p. 299.



believes that occasional occurrence of this complication is an additional argument in favor of enucleation, because at a second operation either enucleation or extirpation can be done without danger of thyroid insufficiency, which might be the case if the usual partial thyroidectomy had been performed.

He claims, further, that by this method of removing these goitres the recurrent laryngeal nerves are absolutely protected, as much normal gland tissue as is possible is preserved, injury of the parathyroid glandules is nearly impossible, and the cosmetic result is excellent.

**SARCOMA OF THE THYROID GLAND.** Vander Veer<sup>1</sup> reports an instance of this rare tumor occurring in a man, aged seventy years, and of six years' duration. The growth began on the right side and at first appeared to be loose beneath the skin, but gradually increased in size until it reached around in front and greatly interfered with breathing and with the voice. It was thought to be a cyst, but at operation, which was performed under novocain anesthesia, the solid nature of the tumor was recognized. Microscopic examination revealed a fibrosarcoma.

**POSTOPERATIVE PARALYSIS OF THE VOCAL CORDS** was discussed in this section last year, when I quoted Monnier as having observed 13 instances of vocal cord paralysis following 670 operations for goitre in Kronlein's clinic. This year Leishner<sup>2</sup> reports the results after 500 operations done in von Eiselsberg's clinic since 1901. Of these, 330 were examined laryngologically before and after operation, and 67 (23 per cent.) were found to have sustained sufficient nerve injury to produce paralysis or paresis of one or both vocal cords. At a period varying from six months to six years after operation these cases were communicated with and the condition of 59 ascertained. The effect upon the voice of 47 of these had completely disappeared, the remaining 12 being affected. Thirty-three of these 59 patients returned for laryngoscopic examination, and of these 17 were classed as normal. The other 26 answered by letter. Leischner concludes from his investigation that while paralysis of the vocal cords may be caused by ligature or section of the nerve trunk without repair of the nerve, yet the voice may subsequently be improved by the compensatory action of the other vocal cord. It is important, therefore, in giving a prognosis to distinguish between anatomical and functional restoration of functions.

**THYROID TRANSPLANTATION.** I have previously<sup>3</sup> referred to Payr's transplantation of bits of thyroid tissue into the spleen. This operation, however, requires great delicacy of technique and is not easy to perform upon a healthy small spleen. Kocher,<sup>4</sup> therefore, proposes a new method by which he has successfully transplanted the thyroid into a long bone

<sup>1</sup> *Annals of Surgery*, December, 1907.

<sup>2</sup> *Mitteil. Grenz. d. Med. u. Surg.*, 1908, Band xix, p. 304.

<sup>3</sup> *PROGRESSIVE MEDICINE*, March, 1907, p. 98.

<sup>4</sup> *Arch. f. klin. Chir.*, 1908, Band lxxxvii, S. 1.

close to the epiphyseal line. The tissue here is quite vascular and very resistant, but the free bleeding, organizing into connective tissue, interferes with the functioning of the transplanted bit of thyroid. Accordingly he makes a pocket and inserts into it a hollow silver ball, about 1 cm. or 1.5 cm. in diameter, and the periosteum, fascia, and skin are sutured in place. In a few days the sutures are removed, the wound reopened, and the ball removed with a hook. The thyroid tissue is implanted in its place into the pocket surrounded by granulation tissue which has not organized sufficiently to form a definite connective-tissue capsule, because if this forms the vascularity of the transplanted tissue will be poor. In his experiments he removed the thyroid and parathyroids without deleterious effects, but, when at a later operation he removed the portion of bone containing the transplanted tissue, the dog died in a few days of acute tetany.

**EXOPHTHALMIC GOITRE.** Together with the parathyroids, this variety of thyroid disease has again been the centre of attraction and the laboratory worker, the internist, and the surgeon have vied with each other in an endeavor to solve the ever-present problem—its metabolism. As regards treatment, several important articles have appeared, although nothing new has been offered along the line of surgery except additional reports confirmative of its advantages. Nothing has been added to our real knowledge of the disease, and herein lies the secret of the diversity of opinion respecting the relative value of eliminative serum, *x*-rays, and surgical methods of treatment. As Thomson well says, "Correct physiology is an essential prerequisite to correct pathology, and we are yet at sea as regards the physiology of the thyroid and its associated structures." Thomson<sup>1</sup> calls attention to our deficiencies of knowledge, the improbability of the thyrotoxic theory, and believes the disease is due to a poison generated in the alimentary canal which excites the thyroid into activity. He believes that by proper diet and the use of fermented milk this disease generally subsides as commonly as does glycosuria after middle life by proper diet.

Rogers and Beebe,<sup>2</sup> in the Mütter lecture of the College of Physicians in Philadelphia, presented the results of their accumulated experience in the treatment of thyroidism by a specific cytotoxic serum. They state that "one gains the impression from the observation of many patients in different stages of exophthalmic goitre that the mortality under ordinary medical treatment is considerably higher than this, the expectation of life after the onset of symptoms in a well-marked case being not more than ten of twelve years." Their mortality has been approximately 10 per cent., and I would judge that between 70 and 80 per cent. of the cases treated are reported as cured or improved. Due caution, however, must

<sup>1</sup> American Journal of the Medical Sciences, 1908, cxxxv, 313.

<sup>2</sup> Archives of International Medicine, 1908, vol. ii, p. 279.



be experienced in regard to considering this method of treatment as a standard one, as sufficient time has not elapsed to say whether the large number (50 per cent.) of patients classed as "improved" will progress to a cure or retrogress into the unimproved class or require operation. Their best results occurred in the very severe acute or the very early mild cases, and this is important because it is in the former that thyroidectomy may result fatally more frequently than in the other forms, in the absence of organic changes in the heart.

*Surgical Treatment.* Last year I referred to Kocher's statistics, he having operated upon 254 patients with only 9 deaths (3.54 per cent.). Since his last report he has increased this number to 320, with 11 deaths (3.44 per cent.), and states<sup>1</sup> that since 1906 he has performed 153 operations with only 2 deaths (1.5 per cent.). He remarks that this mortality is not much greater than that in ordinary goitre, as in the last 600 operations (3600 in all) he has had 3 deaths (0.5 per cent.).

Garre<sup>2</sup> has operated upon 35 patients with exophthalmic goitre, of which 5 were men and 35 women. Partial excision was performed thirty times, ligation of vessels eight times, and resection of the cervical sympathetics (with intraglandular enucleation) twice. At the end of five years the general condition in 50 per cent. of the cases was excellent.

Klemm<sup>3</sup> records the results of 32 operations at Riga. There was no mortality and the operations were all performed under infiltration anesthesia of the skin. Twenty-seven of the patients were women, only 2 cases were seen over fifty years of age, and in 28 per cent. a hereditary tendency was elicited. In 27 of the patients the onset was insidious, in 4 of which the goitre preceded the exophthalmic symptoms. In 5 patients the disease began acutely. The thyroid was diffusely enlarged six times, while in the remainder the right side was distinctly the larger in 21, the left side in 5. He found, furthermore, that the vessels were most dilated on the affected side. He considers the disease to be a vasomotor, trophic, and nervous affection due to abnormal metabolism in the thyroid gland, and believes that the severity is determined by the extent and intensity of the vascular changes. Twenty-seven of the 32 patients were followed, and it was found that to date, fifteen months to eight years after operation, 25 were cured, 1 was improved, and 1 unimproved by the operation.

McCosh<sup>4</sup> has performed 23 operations with one death. He has traced 19 of these patients, 4 of whom are apparently cured, at twelve, eight, seven, and four years, respectively, after operation. Twelve patients were operated upon during the past year, and while too soon to be made the subject of a final report they certainly can be classed as twelve improvements. Of the other 3 patients 2 report marked improvement,

<sup>1</sup> Archiv f. klin. Chir., 1908, Band lxxxvii, S. 131.

<sup>2</sup> Presse Med., February 26, 1908.

<sup>3</sup> Archiv f. klin. Chir., 1908, Band lxxxvi, 168.

<sup>4</sup> Medical Record, 1908, vol. lxxiv, p. 476.

but still suffer from nervousness and tachycardia on exertion; one has not been benefited.

From far Australia even comes corroborative evidence of the worth of partial thyroidectomy in this disease, Dunhill<sup>1</sup> reporting 32 operations on 25 patients, with only one death. Of these there was only one patient who was not improved, and it was noted in this case that while the operative wound was draining to the surface the patient did well with a pulse of 80, but when the wound healed the pulse again rose and the associated symptoms returned. Dunhill makes one observation which seems new, namely, that to crush the portion of the lobe or isthmus before division invites absorption of bruised and pulped thyroid tissue, while if a clean cut is made with a sharp knife the bleeding, which is always in the capsule, can be easily caught by hemostats.

Tuholske<sup>2</sup> recommends a new method of treatment for exophthalmic goitre in place of the usual arterial ligation proposed by Kocher. He states that the plan rests on the following proposition:

“Ligation of the thyroid veins produces dilatation of the capillaries, with increased pressure and transudation of blood plasma through the endothelial capillary tubes into the extravascular spaces, until the pressure of the plasma in the intercellular spaces equals the pressure in the capillaries. The effect of the transudate at first is a mechanical one, there is a crowding of the cells, an interference with oxygen admission, and the retention of carbonic acid—an asphyxia. In this condition the vagrant or indifferent cells, the least fit to survive, suffer a degenerative process and die, while the limitation of arterial afflux brings the gland cells from hyperactivity to the normal. As part of the process the connective-tissue stroma would increase, and later by contraction lessen the size of the gland; in other words, restore it to a condition near the normal. The result of the experiments on the dog distinctly demonstrated the success of the procedure, which in reality consists in the production of a Bier’s passive hyperemia.”

Tuholske was led to propose this method by observing the experimental work on the vascular system of the dog done by Dr. Guthrie.

In the discussion of this paper Charles Mayo<sup>3</sup> stated that in the last 200 cases of exophthalmic goitre operated upon by himself and colleagues there has been a mortality of 5 per cent. They traced 167 of the patients operated upon and found that 70 per cent. were improved, cured, or greatly improved, and 91 per cent. cured, improved, or somewhat improved. He states that ligation is indicated in very mild cases, in those dangerous cases with a degenerated heart muscle, and in those cases where after removal of the right and middle lobes a relapse would occur. Mayo also stated that in operating on over 700 goitres he had not had a

<sup>1</sup> *Intercolonial Medical Journal*, 1908, vol. xiii, p. 21.

<sup>2</sup> *Journal of the American Medical Association*, July 4, 1908; p. 27.

<sup>3</sup> *Ibid.*



single case of tetany, and did not believe that it was quite as serious to remove the parathyroids in the exophthalmic type of goitres as it would be in the old simple colloid goitres or adenomas.

*The psychic factor in Graves' disease* has generally been disregarded as a surgical risk when operating upon the thyroid. Crile<sup>1</sup> urges its importance and suggests that the operative risk may be greatly reduced by "stealing" the gland. When he plans to operate upon a case of Graves' disease he persuades the patient to enter the hospital to be treated either medically or surgically as he sees best and without further discussion. In addition to baths, diet, etc., an anesthetist every morning tactfully administers some volatile oil under an ether mask under the guise of inhalation treatment. Nothing is said regarding the operation, and when the patient's condition seems most favorable operation may be decided upon. In the evening prior to operation bromides are given, and in the early morning a hypodermic injection of morphine administered. The shades in the room are kept drawn and absolute quiet maintained. The anesthetist then administers ether in place of the usual inhalation treatment and the patient is told that this time the treatment will be stronger and that possibly a sore throat will result. In this way the patient is sent to the operating room without psychic excitation.

*Röntgen Treatment of Exophthalmic Goitre.* Reports of reputed cures of exophthalmic goitre are again observed in the literature, and among these three may be picked out for special mention.

Pfahler,<sup>2</sup> from an incomplete study of the literature, observes that of 51 cases treated by the Röntgen rays, 42 cases were followed by good results with no risk and no great inconvenience to the patient. He believes that a trial of the rays should be given for a month, with from six to a dozen treatments, and then if no improvement is shown they can be discontinued. The treatment should be localized upon the goitre, and may be carried to the point of producing a mild dermatitis, but not more. The first dose should not be excessive. The first improvement is an increase in weight followed by an improvement in all the symptoms, the goitre and the exophthalmos being the most refractory.

Holland<sup>3</sup> has treated 20 patients. Unfortunately, like most of the reports of  $x$ -ray treatment of this or other disease, he reports only six cases, and of course the favorable ones, in detail and generalizes upon the remainder. The method of treatment adopted was to give ten minutes (sometimes five only) alternately to either side of the neck for two or three times weekly according to the effects. Contrary to Pfahler's technique he deprecates producing any skin effects and states that in only one case was there any erythema. He came to the following conclusions:

"1. In nearly all the cases carefully noted there was an immediate drop

<sup>1</sup> Annals of Surgery, June, 1908, p. 864.

<sup>2</sup> New York Medical Journal, 1908, vol. lxxxviii, p. 781.

<sup>3</sup> Liverpool Medico-Chir. Jour., July, 1908, p. 330.

in the pulse rate following upon the first three or four exposures, and this in some of the cases was very noticeable. Further, the pulse rate remained reduced.

"2. The muscular tremors and general nervousness also almost always showed signs of improvement from the first, and continued to improve during the course of treatment. In two cases the pulse became normal and the tremors, etc., quite disappeared.

"3. The circumference of the neck in some cases diminished notably, whilst in others no diminution in size occurred. Tense, hard, throbbing glands usually, and after a few exposures, became softer, less tense, and the throbbing diminished.

"4. The exophthalmos was not materially altered in any of the cases.

Holland brings one new point forward, namely, the possibility of myxedema resulting. He has notes of two such cases and suggests that only one side of the gland should be treated first.

Schwarz<sup>1</sup> reports 40 cases of exophthalmic goitre in which Röntgen treatment was used. This is the largest number reported by a single observer that I have seen.

He filters the rays through leather, window glass, or tin-foil, and exposes the thyroid from different sides, so that a given part of the skin is exposed only at intervals of six weeks. In all of his patients the nervous symptoms were relieved; in 36 the tachycardia was diminished; in 26 a distinct gain in weight occurred, one patient gaining forty-eight pounds with no change in the diet; in 15 the exophthalmos disappeared, and in 8 the goitre underwent retrogression.

**The Parathyroid Glands.** The literature upon this subject has increased to such an extent that it would be impossible in the space at my disposal to give even an incomplete *resume* of the different articles. A most complete summary of the literature is given by Kirk<sup>2</sup> and a very complete bibliography is appended. I will simply refer to the papers read by Halsted and MacCallum<sup>3</sup> before the Pathological Society of Philadelphia and the Academy of Surgery of Philadelphia and to the discussion on these papers. Halsted, as a result of transplantation of the parathyroids in dogs, announced the following conclusions:

"1. Parathyroid glands are essential to the life of the animals, and tetany follows their removal.

"2. Transplanted parathyroids (autografts) may for an undetermined time perform, at least, the most evident function of these bodies.

"3. One successfully transplanted parathyroid may suffice to maintain a fair degree of health, even when traces of hypoparathyroidism persist.

<sup>1</sup> Wien. klin. Wochens., September 17, 1908, p. 1332.

<sup>2</sup> Albany Medical Annals, 1908, vol. xxix, p. 851.

<sup>3</sup> Proceedings of the Pathological Society of Philadelphia, April-May, 1908, p. 109.



"4. In autotransplantation success is more common than failure. And they seem to indicate that

"5. Isotransplantation rarely succeeds.

"6. For the successful transplantation of these organs a deficiency of parathyroid tissue should be created.

"7. Transplanted in excess of what is required by the organism parathyroid glands probably do not survive.

"8. Excised or deprived of its blood supply in the course of an operation, the parathyroid should be re-implanted, preferably, perhaps, into the thyroid gland.

"9. Complete excision of the thyroid lobes is well borne for months, at least, by these animals. Myxedema, however, begins to manifest itself within a few weeks."

MacCallum found that in dogs, in which after parathyroidectomy the most violent tetany had developed with muscular rigidity, clonic spasms, extremely rapid respiration and pulse, etc., all the symptoms could be instantly dispelled by the injection of a solution of a calcium salt (the acetate or lactate) into the jugular vein. The injections must be repeated and may be given subcutaneously or into the stomach, but the effect occurs very much more slowly. "On the whole, it seems that the parathyroids exercise some sort of control over the calcium metabolism, so that when they are destroyed there arises an increased excretion of calcium possibly associated with imperfect absorption or assimilation of the calcium, so that the tissues quickly become impoverished so far as their calcium content is concerned."

As a result of the constant emphasis upon the necessity of preserving the parathyroids, I was led to believe that tetany was occurring with alarming frequency even in the hands of experienced surgeons. Inasmuch as my experience and the experience of my colleagues at the University Hospital did not bear out this statement, I was prompted to ascertain from the leading surgeons of the country whether or not my experience was unique. In the experience of 54 surgeons there had been only 8 cases of tetany; of these 3 were fatal, 1 having died in two years after the operation with symptoms only suggestive of tetany. Of the remaining 5, 1 was transitory and 1 was described as a slight case. The total number of operations upon the thyroid gland represented in these statistics is between 1500 and 2000 cases. Granting that many of the cases in this series were partial, not complete thyroidectomies, with a total of only 8 cases, it would appear as though the frequency of tetany as a sequel of thyroidectomy is not such as to occasion much alarm. Of this series of 1500 to 2000 cases, C. J. Mayo performed 560 operations, with but 1 slight case; Crile, 160 operations, with no cases; and McCosh and Sheppard, 150 operations each, with no cases.

Another point which is of practical interest in the consideration of this subject is the recognition of the parathyroid glandules in the course of

the operations. My own experience, based on observations at the operating table and in the pathological and anatomical laboratories, prompts me to question the feasibility of recognizing the parathyroid glandules with any certainty as a routine procedure. Even at the close of an operation I have at my leisure, and unembarrassed by a blood-stained field, searched in vain for the glandules upon the specimens removed. I find that my experience is rather in accord with that of the majority of surgeons.

Of 54 surgeons who answered my inquiry regarding the possibility of recognizing these glandules, only one spoke confidently, or, at least, positively, as to his ability to recognize these bodies. In his series of 160 operations, although looking carefully for them, Crile has only been able to identify them in 3. The most important feature of this whole subject, at least from the standpoint of the practical surgeon, is the development of a technique designed to preserve the integrity of these glandules. There is no question but, theoretically at least, the subcapsular operation is the operation of choice, but I believe this operation difficult of performance; difficult in the recognition of the capsule and difficult in the attempt to strip the capsule from the gland. Owing to the fact that the capsule gives off septa which penetrate the glandular substance, it is difficult to remove the capsule without removing with it a thin layer of parathyroid tissue. The latter modification of the technique was first suggested by Kocher.

Even if the parathyroid glandules should be preserved, some means must be adopted, of course, to preserve their *blood supply*. The suggestion which Halsted makes, that in ligating the inferior thyroid artery the clamp be plunged into the substance of the gland, seizing the artery after it has disappeared from view, is an excellent one. A somewhat safer method, it seems to me, is that of Pool, that at least one of the thyroid vessels, preferably the inferior thyroid, should not be ligated. This suggestion has proved to be of greater significance since Ginsburg<sup>1</sup> published his observations on the blood supply of the parathyroid glandules. Ginsburg found, what escaped the notice of previous observers, that there is a secondary accessory blood supply to these small bodies. In other words, that there is an anastomosis between the parathyroid arteries on one side with those of the other, so that if one of the inferior or superior thyroid arteries is left intact, the blood supply not only of the parathyroid bodies on one side, but of those on the other is preserved. As to the relative importance of the arterial trunks, the inferior thyroid artery is the more important, because the parathyroid artery takes its origin in the majority of cases from this vessel. The existence of this anastomotic relation between the vessels of either lobe no doubt accounts for the fact that tetany has not developed in a larger percentage of cases after thyroidectomies.

<sup>1</sup> University of Pennsylvania Medical Bulletin, January, 1908.



Many of the 1500 to 2000 operations referred to in this report were performed before surgeons were aware of the existence, the function, the minute anatomy, or the vascular supply of parathyroid glandules. Unless some such explanation could be offered, it would be difficult to account for the comparatively insignificant number of cases of tetany that have occurred in the practice of so many experienced surgeons. In the existence of accessory parathyroids we have another explanation for the comparative infrequency of tetany. These accessory glandules are found in positions which the accessory thyroids are likely to occupy, or, as in a case reported by Erdheim, in which two small accessory glandules were found in the thymus.

Geis<sup>1</sup> discusses the *anatomy* especially in regard to variations in the blood supply. He states that they are always supplied by a special artery derived from the main vessels and entering the hilus of the gland. When the parathyroids have become adherent to the capsule of the thyroid an anterior anastomosis is seen, but this does not communicate with the gland itself. In 50 per cent. of the cases there is a large anastomosis with the interior "channel" on the posterior surface of the thyroid gland, the inferior parathyroid artery being a branch either of the inferior thyroid artery or of this channel. The inferior parathyroid artery is always derived from the inferior thyroid artery or from this channel. The superior parathyroid artery is derived according to Geis from the inferior thyroid artery or from the channel, and not as Pool stated from the superior thyroid. In performing the operation of thyroidectomy Geis emphasizes the necessity of being particularly careful to discover the blood supply of the parathyroids before clamping the inferior thyroid artery.

TETANY FOLLOWING THYROIDECTOMY is reported by Brandam.<sup>2</sup> After removal of a colloid goitre from a girl, aged fourteen years, tetany developed eighty-eight hours after operation. The usual symptoms were observed and persisted for about three days, when they disappeared under the use of subcutaneous injections of parathyroid emulsion. One year after operation the patient was seen and found to be free from any symptoms of tetany, and Branham explains this phenomenon by the fact that these parathyroids were not all removed at operation, but were undoubtedly so damaged by the traumatism that their function was suspended, but after recovery their normal work resumed and possibly compensatory hypertrophy resulted.

Carter<sup>3</sup> refutes the statements of Vincent and Jolly that a fatal result may not occur after complete removal of both thyroid and parathyroids by reporting a series of experimental operations upon these organs. His conclusions agree with other observers in regard to the effects produced by complete parathyroidectomy. He believes that the develop-

<sup>1</sup> Annals of Surgery, April, 1908, p. 523.

<sup>2</sup> Ibid., August, 1908, p. 61.

<sup>3</sup> Texas State Journal of Medicine, 1908, vol. iii, p. 229.

ment of acini in a parathyroid after thyroparathyroidectomy is not, as claimed by Vincent and Jolly, an evidence that the glandule is assuming the function of the thyroid but is merely one of compensatory hypertrophy.

TUMORS OF THE PARATHYROIDS have been reported rather frequently of late years, and the list now numbers 14. The most recent is recorded by Thompson and Harris.<sup>1</sup> They report a tumor measuring 15 x 10 x 6 cm., removed from a woman aged twenty-three years. The case was diagnosticated as one of goitre, but upon microscopic examination was found to be an epithelial tumor in which the cells resembled the structure of the parathyroid glandule.

Da Costa's<sup>2</sup> tumor was regarded as an adenomatous goitre, was irregular in outline, and presented, in front and at the lower portion, a bulb-like projection, somewhat darker and softer than the remainder of the mass. The tumor was found to be a "hyperplasia or an adenoma of the parathyroid," and the bulb-like projection was thyroid tissue. There is no mention made of any symptoms except those of a goitre.

EXPERIMENTAL CHRONIC PARATHYROIDITIS. Thompson and Leighton<sup>3</sup> endeavored to ascertain how much they could interfere with the blood supply of the parathyroids without completely destroying them. They experimented upon dogs, and after isolating the parathyroids lifted them up by wide rat-tooth forceps which were crushed into the underlying thyroid tissue, and a strong linen ligature passed around the whole mass. This procedure imitated the accidental injury which might occur in connection with thyroid operations. The parathyroids were not intentionally injured, however. As a result of these experiments they conclude:

"That following the gradual destruction of the parathyroid glandules in the dog a train of symptoms arises, different from those obtained by parathyroid excision. After ligation of all parathyroid tissue the dog passes the time limits of tetanic death practically without symptoms. Gradually, however, chronic symptoms trophic in nature arise. These consist in gradual but progressive loss of weight and strength, greatly diminished resistance to infection, and a final stuporous condition ending in death without tetany. These nutritional disturbances are as marked when the thyroid is not injured as they are when the thyroid is removed on one side."

**The Thymus Gland.** Sharing in some degree in the awakened interest to which the thyroid and parathyroid bodies are being subjected the thymus has, however, not received the study its importance justifies. The best piece of experimental work done upon it in recent years is by Alexander MacLennon.<sup>4</sup> Under ether anesthesia he cut away the

<sup>1</sup> *Journal of Medical Research*, July, 1908, p. 135.

<sup>2</sup> *Proceedings of the Pathological Society of Philadelphia*, April-May, 1908, p. 126.

<sup>3</sup> *Journal of Medical Research*, July, 1908, p. 121.

<sup>4</sup> *Glasgow Medical Journal*, 1908, vol. lxx, p. 97.



sternum from the upper two ribs of young rabbits and removed the gland. He noted that within a few days the animal which had had its thymus removed was observed to be more voracious than its brothers and sisters, increased in weight, and was more resistant to certain animal diseases. The animals were killed later and it was noted that the epiphyseal cartilage was thickened, but the bone marrow was unaltered. The thyroid appeared more cellular in the thymusless than in the controls, had larger adenoid masses, and the glandular spaces were smaller.

**THYMIC ASTHMA.** Schwinn<sup>1</sup> comments upon the dearth of literature regarding the thymus and reports a case of thymic asthma where the thymus was almost completely removed, with recovery, in a child aged twenty-three days. Thymic asthma is due in most cases to the pressure of an enlarged thymus gland on the trachea, and the organ is usually the seat of inflammation, tuberculosis, syphilitic or simple parenchymatous enlargement. When one considers that the anteroposterior diameter of the upper aperture of the chest cavity in a child measures only a few centimeters, it is evident that any enlargement of the thymus will compress the hollow tubes also passing through the opening. The symptoms of this disease are essentially due to pressure, namely, cyanosis, inspiratory or expiratory stridor, retraction of the subclavicular, infraclavicular, and intercostal spaces during inspiration, and death may occur with or without convulsions. The only physical sign of moment is an abnormal dulness to percussion over the upper part of the sternum. Tracheobronchoscopy may permit one to see directly the narrow slit to which the trachea is compressed or the *x*-rays used to see the large shadow made by the gland, merging into the shadow of the heart in a convex line.

Operation should be performed as soon as a diagnosis is made, and the thymus removed. Schwinn states that it may be necessary to split the manubrium of the sternum in order to prevent alarming dyspnea. Tracheotomy should be avoided if possible. In addition to the case reported Schwinn collects seven others, namely, those of Rehn, Koenig, Perrucker, and Jackson.

Pedrazzini<sup>2</sup> reports three cases of sudden death in young children from thymic asthma. He believes that if the thymus is enlarged in whole or in part many accidental congestions, such as irritation of the vagus, gastric indigestion, helminthiasis or intestinal disturbances may produce severe suffocation or sudden death. The enlarged thymus may be removed in the usual manner, but Pedrazzini prefers division of the first costal cartilages close to the sternum, thereby affording relief from the compression combined with simplicity of technique.

Capelle<sup>3</sup> discusses *the relation of an enlarged thymus to exophthalmic*

<sup>1</sup> Journal of the American Medical Association, June 20, 1908, p. 159.

<sup>2</sup> Gazzetta degli Ospedali e delle Clin., June 14, 1908.

<sup>3</sup> Beiträge zur klin. Chir., June, 1908.

*goitre*. The autopsy records showed an unusual size of the thymus in 79 per cent. He believes that the existence of this enlargement may be diagnosticated during life by percussion, palpation, Röntgenoscopy, and symptoms of status lymphaticus. If other glandular organs, such as the spleen, tonsils, and follicular glands of the tongue are enlarged, an enlarged condition of the thymus may be conjectured. In a later article<sup>1</sup> he reports an additional case of thymus death in an individual with exophthalmic goitre, the fourth in his experience, and offers additional evidence that the diagnosis may be made before operation.

### THE ESOPHAGUS.

**Carcinoma of the Esophagus.** The treatment of esophageal carcinoma has been signally unsuccessful, especially in the operations performed upon the lower portion of the tube. According to McGavin,<sup>2</sup> esophageal cancer constitutes about 5 per cent. of all carcinomata, and affects the male sex in about 73 per cent. of cases; a few cases in females have been reported in early life at ages ranging from nineteen to twenty-three years. The majority of cases, however, are seen about the fiftieth year of life. The growth occurs in the proportion of 10 cases in the cervical region, 40 at the level of the tracheal bifurcation, 30 at the lower end, and 20 secondary to carcinoma of the stomach. The tumor tends to spread around the tube rather than along it, and rarely extends into the stomach, although a cancer of the cardia frequently involves the esophagus.

McGavin advises against operation in all cases. In the cervical portion the best that can be hoped for is a retardation of the disease for periods ranging from eleven to fifteen months. The postoperative mortality in 15 cases was 33 per cent., and eventually all died of recurrence. While his conclusion may hold good for most cases, and especially for deep-seated lesions, it must not be forgotten that successful cases have been reported. Hildebrand,<sup>3</sup> for example, has operated upon six esophageal cancers, one case remaining well and free from recurrence for three years.

Hacker<sup>4</sup> operated upon two esophageal carcinomata and one sarcoma. One case remained free from recurrence for one and one-half years. After the esophagus was resected and the larynx extirpated, an esophago-plastic operation performed in three stages was so successful that the patient was able to swallow without difficulty even without the use of bougies.

<sup>1</sup> Münch. med. Wochenschrift, September, 1908.

<sup>2</sup> Practitioner, September, 1908.

<sup>3</sup> Berliner klin. Woch., March 23, 1908, p. 581.

<sup>4</sup> Arch. f. klin. Chir., No. 87, Heft 2, p. 257.



It seems fair to conclude that in selected cases, that is, in young subjects otherwise healthy, with a small growth in the cervical region, without obvious invasion of the lymph nodes, an operation is justifiable. McGavin recommends that the mouth and teeth be kept scrupulously clean for days before the operation, and that gastrostomy be performed at least a week earlier, partly to avoid infection of the cervical wound, and in part to provide a means of nourishing the patient should speedy recurrence follow. To prevent absolute starvation permanent intubation is recommended in selected cases. The introduction of the tube causes a little gagging and retching at first, but the patient soon becomes accustomed to the apparatus and rapidly gains in weight. This method should not be used when the lesion is in the cervical region.

Concerning the outlook for operations on the lower portion of the esophagus, Hildebrand<sup>1</sup> is very pessimistic. He is inclined to believe that even when the dangers of pneumothorax are avoided by the use of a positive or negative pressure apparatus there are still insurmountable difficulties. For the present we should be content with palliative gastrostomy; the latter is devoid of risk and makes the patient comparatively comfortable, while resection is difficult, dangerous, and attended with many complications.

On the other hand, the work of Sauerbruch,<sup>2</sup> already alluded to, the experimental work of Green and Maury,<sup>3</sup> Wiener's case,<sup>4</sup> in which the costal arch and the lower end of the esophagus was removed, lead us to hope that more may be expected from this field of surgery in the future.

**Osteoplastic Resection of the Costal Arch.** In order to remove the lesser curvature of the stomach and the lower end of the stomach, Wiener<sup>5</sup> resected the costal arch. The operation was done in two stages, thirty days elapsing between the osteoplastic resection and the resection of the stomach and esophagus. The patient was forty-five years of age. She complained of gastric disturbances for ten years, and the clinical diagnosis of carcinoma of the lesser curvature of the stomach was made. Exploratory celiotomy was performed and a tumor was found involving the lesser curvature of the stomach and the cardia. The growth was very movable, but could not be brought into the field of operation. A second incision was then made parallel to the costal margin of the left side, the seventh, eighth, and ninth ribs were exposed and divided close to the sternum. The growth was freed from the gastrohepatic omentum, which was tied by catgut ligatures. During the patient's postoperative course she developed an extensive cellular emphysema, which did not cause any inconvenience. The second operation was done under spinal anesthesia and a large V-shaped piece of the stomach, containing the tumor, and about one and one-fourth inches of the lower end of the

<sup>1</sup> Loc. cit.

<sup>2</sup> Loc. cit.

<sup>4</sup> Vide infra

<sup>3</sup> Journal American Medical Association, September 5, 1908,

<sup>5</sup> Annals of Surgery, October, 1908,

esophagus were removed. The stomach wound was closed and a new opening made at a portion of the stomach nearest the cut end of the esophagus. Into this small opening the end of the esophagus was implanted and fastened in place with linen sutures. The patient was given a little water to see if the closure was perfect, and two points of leakage were observed.

The patient died on the eleventh day. A large subphrenic abscess was found on the left side, due to leakage from the point of anastomosis between the stomach and esophagus. Imperfect union was attributed to the absence of a peritoneal covering to the esophagus where the latter was joined to the stomach.

**Foreign Bodies in the Esophagus.** Thiemann,<sup>1</sup> in discussing methods for the removal of foreign bodies from the esophagus, lays special emphasis upon the measures which can be used by those who are not familiar with the more advanced technique of esophagoscopy. In the clinic at Jena in the past ten years only 30 cases have been treated surgically. This small number is due to the fact that many foreign bodies are removed by practising physicians by means of coin catchers, or they are pushed into the stomach by some form of instrument. He relates several instances in which the foreign body was removed by non-operative measures, and recommends the technique which was first used by Kramer, namely, the removal of the foreign body by freely exposing but not opening the esophagus. The advantage of this method is quite apparent; esophagotomy is attended with a high mortality, the dangers of postoperative infection and of esophageal fistula are considerable; the postoperative convalescence is shortened, the wound is not infected, and there is no danger of subsequent cicatricial stenoses. The method can be used only in those cases in which the foreign body lies in the upper portion of the esophagus, where it can be felt from the outside, and is contra-indicated in those instances in which the body has been impacted for a long time, or has caused softening or infiltration of the esophageal wall with abscess formation or bleeding. If the foreign body is so tightly wedged in the esophagus that considerable danger arises in pushing it upward, the esophagus should be opened. While the body is being pushed upward the esophageal wall should be raised in order to prevent the foreign body from injuring the mucosa, and, as the body approaches the mouth cavity, it can be seized with forceps and removed. Two cases are reported in which artificial teeth impacted in the esophagus were removed by this method.

**Stricture of the Esophagus.** The diagnosis of benign stenosis of the esophagus is greatly aided by the esophagoscope, the x-rays, and, clinically, by the new sign described by Revidtzev.<sup>2</sup> The passage of fluid through the esophagus is attended with two distinct sounds. The first is

<sup>1</sup> Arch. f. Chir., Band lxxxv, No. 3.

<sup>2</sup> Semaine Médicale, February 19, 1907.



caused by muscular contraction, and the second by the entrance of fluid into the stomach. In cases of esophageal stenosis, some of the fluid is retained above the constriction. Revidtzev noted that when the patient was instructed to swallow, the second sound was produced by the propulsion of the retained fluid into the stomach.

Seelig,<sup>1</sup> in examining a case of esophageal obstruction, made his *x*-ray exposures with a rubber tube and a fine gold chain in the esophagus. The radiograph revealed the point of stenosis and a dilatation of the esophagus above. An external esophagotomy disclosed a stricture of so small a caliber that the smallest probe could be engaged in the opening with difficulty. The immediate and remote operative results were most satisfactory; the patient could swallow solid food without difficulty.

Several case reports of the diagnostic aid of the esophagoscope and its usefulness in treatment have been made.

Leiche<sup>2</sup> successfully dilated a stricture through the esophagoscope, and by treating the inflamed mucosa above, the tendency to esophagospasm was overcome. Clark<sup>3</sup> was unable to pass bougies through a stricture, but found that dilatation could readily be performed through the esophagoscope. The difficulty in passing flexible bougies even after the stricture had been dilated is due in many instances to the presence of some dilatation or even a diverticulum. The entrance to the stricture is not always in the middle. Before passing the esophagoscope the patient should be instructed to swallow a thread; the latter enters the stricture and serves as a guide.

**Chronic Cardiospasm.** We understand by *cure* in these cases a return of the normal permeability of the cardia, and subjectively a relief of symptoms attributed to the disease. The contraction of the cardia is best overcome by dilatation, a measure Gottstein<sup>4</sup> used with favorable results in six cases. The dilatation is accomplished by distending the balloon, previously inserted in the cardia, by a known amount of water. The treatment may be repeated as often as required. In this respect the method is far superior to von Mikulicz's operation of manual dilatation. Occasionally the patients complain of severe pain when the dilatation is being effected, but this is readily relieved by releasing a small amount of fluid. It was not necessary in Gottstein's experience to use any form of anesthesia, although he would not hesitate to use morphine if the pain were too marked. Narcosis is undesirable because it prevents the patient from giving valuable information concerning the degree of pressure, as indicated by the degree of pain. Consecutive dilatation appears to give better results than when the cardia is distended a single time. Strictures

<sup>1</sup> Surgery, Gynecology, and Obstetrics, September, 1908.

<sup>2</sup> Journal American Medical Association, April 4, 1908, p. 1122.

<sup>3</sup> Boston Medical and Surgical Journal, March 12, 1908.

<sup>4</sup> Arch. klin. Chir., Band lxxxvii, Heft 3.

impermeable to instruments usually require operation. If by manual dilatation through a gastric opening, the surgeon should be content with the distention obtained with two fingers.

### THE MAMMARY GLAND.

**Operative Indications.** We recognize in general certain very definite operative indications and contra-indications in the treatment of mammary carcinomata. English<sup>1</sup> reviews some of these important questions, and observes that the cases in which the supraclavicular lymph nodes are involved are instances in which hard and fast rules of treatment cannot be laid down. Clinical experience, however, has shown conclusively that this complication does not make the prognosis absolutely hopeless, and that in some cases there is sufficient prospect of success to warrant operation. The enlarged nodes present are not always cancerous, and may disappear after removal of the growth. When the lymph nodes are malignant, English indorses the operative procedures as advanced by Halsted. The difficulty in the early detection of these cases is due to the density of the deep cervical fascia, which makes palpation of the enlarged nodes difficult. In one group of cases the nodes are moderately enlarged and not fixed; there are then no special technical difficulties; in fact, the procedure is often more simple than palpation had led one to expect. In the second group of cases the process is more advanced; the mass of lymph nodes is firmly fixed, situated behind the clavicle and often dipping down behind the sternomastoid muscle. In these cases operation is hopeless.

**Atrophic Scirrhus.** This is a condition about the treatment of which opinions vary greatly. Many surgeons recommend that these cases should not be operated upon, because the disease may exist for many years without causing serious trouble, because some patients die of other diseases before the lesion affects their general health, and because the operation may be followed by a sudden awakening of the process. While it is true that patients with this variety of cancer may live for many years, it should not be forgotten that many die ultimately from internal metastases; many of them suffer a great deal of local pain and discomfort; and sometimes, when apparently atrophic, the tumors may suddenly spread and become inoperable. A thorough operation in these cases affords an excellent chance of permanent cure, relieves the local symptoms and the mental distress of the patient.

*Pregnancy* should never be made a reason for the postponement of operation. In considering the question of treatment, two main facts present themselves: (1) The rapidity with which breast cancers grow

<sup>1</sup> Practitioner, September, 1908.



and spread during pregnancy and lactation; (2) the risk of miscarriage after an extensive operation. The indications are perfectly clear; the case should be treated exactly as if pregnancy did not exist. Delay means rapid increase in the growth and probably early death; even without operation there is a liability to miscarriage or to the non-survival of the child. The risks of miscarriage after operation are not great. If the patient is in the last month of pregnancy, labor should be induced, and the breast removed as soon afterward as possible.

*Contra-indications.* The conditions which should be regarded as contra-indications to operation are: (1) Fixation of the growth to the thorax; (2) extensive involvement of the skin, either in the form of infiltration or of multiple widely scattered nodules; (3) implication of the axillary vessels or nerves; (4) deposits in viscera or in the bones. In these apparently hopeless cases there may be sufficient improvement after the use of the *x*-rays to enable one to perform the radical operation later.

**After-treatment of Breast Cancer.** Surgeons have devoted much attention to the subject of postoperative care of breast cases, for the purpose of avoiding certain troublesome complications. In *PROGRESSIVE MEDICINE* for March, 1908, several measures were described which had been devised to avoid lymphatic stasis and the loss of arm movement after operation. Heile,<sup>1</sup> in a series of cases, has developed a technique differing from that of Lexer and others, which has given him uniformly good results. This method has the additional advantage of enabling the patient to be about the day following operation. By transplanting the pectoralis minor muscle, the exposed axillary vessels are covered, and stasis and swelling of the arm are prevented by limiting contraction of the scar. Although the author removes the pectoralis minor when necessary, in the majority of cases, however, this muscle is uninvolved, and can be used for transplantation. The pectoralis minor is detached from the ribs, its insertion into the coracoid process is undisturbed, and from its posterior surface all fat is removed. After the axilla is thoroughly cleansed, the muscle is placed over the exposed axillary vessels, where it is held in position by sutures. A light dressing is then applied, so that the affected side is freely movable, and from the day after operation the patient is encouraged to use the arm. In none of Heile's cases has edema of the arm occurred. The transplanted muscle in course of time undergoes atrophy, but prevents adhesions between the skin and axillary vessels during the healing of the wound. The same result that Lexer endeavors to bring about by his method of extension may be obtained by Heile's plan in a very much shorter time.

For some years the use of a triangular splint has been advocated in the postoperative care of breast amputations. Dawbarn<sup>2</sup> suggests a modi-

<sup>1</sup> Münch. med. Woch., 1908, No. 30.

<sup>2</sup> *Annals of Surgery*, March, 1908.

fication of the position of the splint which, on the one hand, is more comfortable for the patient, and, on the other, insures a wider range of motion. When the splint is in place the patient's palm rests on the back of her neck, the front of the forearm lies in contact with her cheek, while the elbow looks directly forward. Adhesive plaster is employed for fixation, a wide strip starting at the back of the opposite shoulder, thence running along the back of the hand and forearm to the elbow, where it splits into two and is wrapped about the upper arm and the triangle. The splint rests on top of the chest dressing.

To restore to the arm the power of flexion and adduction Dawbarn attaches a portion of the deltoid to the stump of the pectoralis major muscle. An inch or more of the anterior portion of the deltoid is detached from its origin, the muscle being split in a direction parallel to its long axis for a distance sufficient to permit the detached portion to be sutured to the stump of the adjacent pectoralis major. This procedure is, of course, contra-indicated when the cancer extends to the vicinity of the muscles employed in the anastomosis, but this seldom occurs. The portion of the deltoid entering into the anastomosis is not deprived of its innervation, does not undergo atrophy, and does facilitate flexion and adduction of the arm.

† TANSINI METHOD. The method of Tansini (which has been discussed in previous numbers of PROGRESSIVE MEDICINE) was devised to prevent recurrences and to provide an autoplasmic flap for the repair of the defect left by the removal of the gland. The original method was thoroughly tried, but it was found that a portion of the flap underwent necrosis, a complication which greatly diminished the usefulness of the operation by delaying the healing process.

Tansini, therefore, modified his technique to include in the flap the latissimus dorsi muscle, and in order to insure a rich blood supply for the flap a portion also of the teres major muscle. The loss of the substance of the latissimus dorsi at the same time made it much easier to approximate the edges of the defect from which the flap was taken. The flap is made as follows: "The pedicle is about two inches and one-half or two inches and three-quarters wide, and in order to include in it the most important arterial branches its centre is to correspond to a point which must be at one inch and one-quarter from the posterior axillary line, two inches from the spine of the scapula, and four inches from the inferior angle of the scapula. The flap is of a long oval shape and of dimensions proportional to the wound which is to be covered, and is to be directed from above down and rather obliquely toward the median line of the back. The anterior edge of the pedicle is to start from the extremity of the axillary wound, and afterward, when the flap is brought forward, it joins the anterior edge of the wound itself; the posterior edge, which is cut into the skin of the back at about two inches and one-quarter from the anterior edge, in order to include the emerging point of the



arterial branches, is sutured to the posterior margin of the axillary wound."

Purpura<sup>1</sup> believes this method should be more generally practised. He describes the technique of the operation, mentions the good results obtained in Tansini's cases, and publishes several photographs to illustrate the excellent cosmetic and functional results.

**Carcinoma of Both Breasts.** Willis<sup>2</sup> reports a bilateral carcinomatous involvement of both breasts. The patient, aged thirty-nine years, complained first of pain in the left breast; the latter was tender and indurated and the nipple retracted. The axillary nodes were not involved. A diagnosis of chronic interstitial mastitis was made. Two years later the breast showed very little change, but there were now enlarged nodes in the axilla. A year later the right breast became involved. Both breasts and the axillary contents were removed, and proved upon microscopic examination to be carcinoma. The following interesting points were raised in connection with the case: Was the disease in the left breast chronic mastitis or carcinoma from the beginning? While it is quite impossible to speak positively, the absence of a definite tumor, the diffuse character of the induration, and the tenderness and non-involvement of the skin and underlying structures point rather to a benign affection.

Willis is inclined to regard the tumor in the left breast as being secondary to the benign process; the right breast he thinks was involved by a direct extension of the tumor from the left breast.

It should be remembered that chronic cystic mastitis is a disease which is often bilateral, undergoing malignant degeneration in about 15 per cent. of the cases. It is not unlikely, therefore, that with the right as well as the left breast the carcinoma was preceded by this benign lesion. This explanation seems more plausible than the one offered by Willis.

**Carcinomatous Degeneration of Breast Cysts.** Occasionally a cancerous invasion of a cyst wall occurs from without, the process developing primarily in the breast. The diagnosis depends upon the age of the patient, the majority being from forty to fifty years of age. Rapid enlargement of the cyst, especially if followed by the involvement of the axillary lymph nodes, should be regarded as very significant of beginning carcinomatous degeneration. In the majority of cases the presence of fluid in a cyst without an intracystic papilloma to explain the hemorrhage can be regarded as diagnostic of malignancy. When cysts are opened at the time of operation, the lining should be carefully examined for thickened or indurated areas and papillary projections. The latter even when quite small may be the seat of an early but highly malignant process.

A case of this character is reported by Speese.<sup>3</sup> The patient, aged sixty-seven years, received a blow over the left breast nine months before

<sup>1</sup> Lancet, February 2, 1908.

<sup>2</sup> Clinical Journal, September 23, 1908, p. 382.

<sup>3</sup> New York Medical Journal, February 22, 1908.

operation. A short time after the traumatism a small nodule developed, and grew slowly until it became the size of an orange. There was no retraction of the nipple, the skin was slightly adherent to the growth, and a few axillary nodes were enlarged and indurated. A radical operation was undertaken on account of the possibility of malignancy. The cyst contained a thin, black fluid, the wall was reticulated and well-defined from the surrounding breast tissue.

Microscopic examination of the cyst wall showed an infiltration of epithelial cells resembling a scirrhus cancer. The surrounding tissue was almost devoid of glandular elements, and was typical of an involuting breast.

The treatment of cancerous cysts differs in no way from that of any malignant tumor of the breast. While in many cases the degree of malignancy is low, we are not justified in temporizing, but should resort at once to a radical operation.

**Carcinoma and Tuberculosis of the Breast.** The association of these two diseases in certain organs depends, in part, upon the disposition they have to develop in these organs and in part upon the possibility of a secondary implantation of one of the diseases upon the other. Thus, chronic lupus of the skin gradually causes sufficient irritation to produce a carcinomatous degeneration of the epithelium, or tubercle bacilli may be deposited on an ulcerating carcinoma of the esophagus. But primary tuberculosis of the breast is particularly rare, and Fricke<sup>1</sup> asserts that only 80 cases have been reported. The association of tuberculosis and cancer is even more uncommon, for only six such cases have been recorded. The case the author reports began as a small nodule in the breast, nine months before observation. The tumor was painless, but later became tender on pressure, and enlarged gradually. An examination revealed marked retraction and fixation of the skin, the presence of an ulcer with red margins, covered with scabs, and retraction of the nipple. The entire breast was infiltrated, the musculature was extremely involved, and a few axillary lymph nodes were palpably enlarged. The microscopic examination showed a predominance of the cancer, but also a tuberculous process of recent origin. Tubercle bacilli were not found.

Other authors, reporting cases of this type, have had different views as to which was the primary lesion. In this case the cancer was regarded as the primary lesion, judging from the clinical history and the microscopic examination of the small amount of tissue removed. The source of the tuberculous infection is difficult to explain. As there was no indication of tuberculosis elsewhere, a hematogenic infection was improbable. The bacilli most likely gained entrance through the ulceration of the breast tumor, and the fact that the husband was supposed to have had phthisis suggests a possible source of infection.

<sup>1</sup> *Beit. klin. der Tuberkulose*, 1907, vol. viii.



**Abscess of the Breast and Carcinoma.** Surgeons are familiar with these cases of chronic abscess of the breast, presenting the clinical picture of cancer, when the gland was needlessly sacrificed. When there is a reasonable doubt as to the diagnosis, Dawbarn<sup>1</sup> recommends a single bold incision, through which one can immediately differentiate between cancer and abscess. The wound should be tamponed at once, if pus is absent, and the gauze soaked in Harrington's solution or boiling water to seal the open lymphatic vessels.

Dawbarn strongly recommends dissection of the axilla before the removal of the breast. Thus performed, the operation is no more difficult, and the danger of squeezing cancer cells into the lymph circulation is eliminated. The lymphatics draining the breast are easily and safely divided when the axilla is attacked first, and it should no longer be held justifiable for the surgeon to run any risk of squeezing cancer cells into the circulation by manipulation of the breast incidental to its removal in the way almost universally practised.

Whiteford,<sup>2</sup> in recommending the use of the "plastic operation" for the removal of *benign breast tumors*, concludes that every breast tumor should be incised prior to its removal. The surgeon who, in performing a radical operation for *supposed* malignant disease of the breast, neglects the elementary precaution of incising the tumor as a means of either confirming or disproving the diagnosis runs the risk of finding himself in the unenviable position of having performed Halsted's or some equally extensive operation for a single tumor, such as an adenoma or abscess. The exploratory incision should not be made through the skin which overlies the tumor. In the event of the tumor being benign, an incision so placed would leave a very unsightly scar.

**Paget's Disease of the Nipple.** The interest to the pathologist in this affection of the mammary gland, lies in the derivation of the disease and the relationship it bears to the production of carcinoma. Paget's description of the affection remains classical, but few facts can be added to those which were originally described by him. Hannemuller and Landois,<sup>3</sup> in reviewing the subject, add two cases to the literature, which now contains the reports of about 100 cases. In both instances the diagnosis was made from the history and the clinical picture of the disease, which is sufficiently characteristic, as a rule, to permit a diagnosis even in the earliest cases. The disease is distinguished from an eczematous condition by the absence of the intense itching, never present in any stage of Paget's disease. The color and moisture of eczema are important points of differentiation; induration is not present and the lesion responds more promptly to local treatment. Other diseases, which may be mistaken for Paget's disease, are lupus, syphilis, and rodent ulcer. Lupus is characterized by nodules

<sup>1</sup> Annals of Surgery, March, 1908.

<sup>2</sup> British Medical Journal, June 6, 1908.

<sup>3</sup> Bruns Beiträge, Band lx, Heft 1 and 2.

and points of ulceration; syphilitic ulceration is recognized by its sharply defined margins and fissured base, the rapid course, the history, and the therapeutic test. The site of the lesion is of most importance in differentiating it from rodent ulcer.

The microscopic examination of the cases of Hannemuller and Landois revealed a carcinoma, not originating in the squamous epithelium of the skin, but in the underlying structures; the tumors grew toward the epiderm and gradually infiltrated the eczematous areas. The cancer sprang from gland epithelium and retained the characteristic appearances. Pathologists have agreed that Paget's disease originates in the gland epithelium; that it may spring from the squamous epithelium of the nipple, from the milk ducts, or from the gland epithelium. Paget's disease is primarily a carcinoma. In advance of the process, as it approaches the skin, there is a round-cell reaction, a layer of granulation tissue forms, which, as it advances, destroys the epiderm and gives to the surface the characteristic appearance. The surface lesion, therefore, is not eczema at all, but a layer of granulation tissue infiltrated with cancer cells. The futility of treating it by local measures is apparent.

**Tumors of the Breast in Childhood.** This subject has been fully discussed in the contribution by Jopson, Speese, and White.<sup>1</sup> They have concluded that a large majority of the tumors are benign in character, and divide these into benign tumors of vascular origin and benign tumors other than those of vascular origin. The angiomas may be destroyed by the cautery, if small; the large ones at times require extirpation, and in some instances are of such a size that complete removal of the breast may be necessary. They report two new cases, one of which occurred in a girl, aged eleven years, who presented symptoms suggestive of a sarcoma. Her right breast was the size of a fetal head, hard, with tense and shiny skin, retraction of the nipple, and the overlying veins were distended. The breast was removed, and on microscopic examination was described as a diffuse fibroma. Including their own cases, 15 instances of growths of this type have been reported. The conclusions reached may be summed up as follows:

Tumors of the breast, while rare in childhood, occur in both sexes and at all ages. The benign tumors are more frequently encountered in the mammary gland in early life than the malignant tumors. The fibro-epithelial growths are the most numerous group of the benign tumors, and next to these in point of frequency come the angiomas.

Sarcoma may occur in children in the mammary gland, but it is a rare tumor. The breast enjoys almost complete immunity to carcinoma before the age of puberty.

Girls are affected more frequently than boys, but the disparity in numbers is immensely less than in adults.

<sup>1</sup> *Annals of Surgery*, November, 1908.



The angiomata are commonly congenital, or first appear in infancy. The fibro-adenomata tend to develop more frequently as the child approaches puberty.

Some of the smaller benign tumors occasion no inconvenience. Others are associated with pain, tenderness, and inconvenience or discomfort from excessive weight or size. Sarcomata present the symptoms common to that type of tumor.

Operation is usually indicated in the benign and always in the malignant varieties. In small benign tumors, or those involving only limited areas, conservative plastic operations with preservation of breast and nipple are indicated. In a goodly number, however, the breast must be sacrificed. The axilla should be cleaned if it contains enlarged glands. The results of operation are good.

**Mastopexy** is an operation designed for the relief of *pendulous breasts*, and is especially indicated when the latter are associated with a severe eczema. The operation devised by Dehner<sup>1</sup> is, so far as we know, original. It is designed to correct the pendulous condition of the breasts, and at the same time to maintain the organs in their normal position. The first indication is fulfilled by removing a large elliptical section of skin and subcutaneous tissues from the lower portion of the gland; this allows the breast to be raised to a higher position. A second elliptical section from the upper portion of the breast, and extending to the pectoral fascia, greatly reduces the size of the gland. The normal contour of the breast is restored by anchoring it with catgut sutures to the third rib. The operation was practised on both breasts; the wounds healed rapidly and, while leaving a large curved scar, the breasts were maintained in their normal position and in form closely resembled normal glands.

**Treatment of Mastitis by Hyperemia.** From the result of Bier's experience it has become a generally accepted fact that puerperal infections of the mammary gland are favorably influenced by passive hyperemia. Several contributions to this subject have appeared since his original treatise, and an analysis of the results obtained supports his contention in certain respects, and serves in particular to indicate the precise cases in which hyperemia is most advantageously used. Zangemeister<sup>2</sup> has observed 50 cases of mastitis, 17 of which were treated by passive hyperemia. In the earlier stages of the infection the author lays especial emphasis upon the dangers of emptying the breast by pumps or by permitting the child to do so by sucking. The infection at this time is best overcome by rest, pressure, local applications, and the depletion of the system by large doses of magnesium sulphate. In the cases in which passive hyperemia was induced some amelioration of the symptoms was noted, but the exudation seemed to increase and the inflammatory

<sup>1</sup> Münch. med. Woch., 1908, No. 36.

<sup>2</sup> Deutsche med. Woch., 1908, No. 6, p. 240.

swelling disappeared less rapidly. Eleven of the 17 cases underwent suppuration, or three times as many as resulted from the usual form of treatment.

Zangemeister believes that passive hyperemia in the early stages of mastitis is not of great value in preventing suppuration, and supports his claim by the reported cases of several clinics, in which, however, the percentage of secondary suppuration was not as high. It should be stated in this connection, however, that in the experience of many others passive hyperemia has had a most favorable influence. Thus, according to Heinsius and Lissauer,<sup>1</sup> almost without exception the results have been satisfactory, not only in the late but in some cases in the early stages. Similar results are as frequently obtained by the use of other local measures.

Most observers admit that the method is certainly of great value in those cases in which the process has advanced to suppuration but is still more or less limited. In these cases small incisions followed by suction give almost immediate relief, favor resolution, and at the same time yield an excellent cosmetic result.

**GANGRENOUS MASTITIS.** This variety of puerperal mastitis is described by Feinen<sup>2</sup> in his general consideration of puerperal infections of the mammary gland. It is characterized by a pronounced swelling, a diffuse thickening of the breast which becomes dark red or black in color, with a tendency to spread rapidly to the surrounding parts. Extensive cauterization with the thermocautery to the boundary of the swelling and numerous incisions into or removal of the gangrenous areas are recommended as appropriate measures. Feinen reports two cases, both of which were bilateral and terminated in gangrene of the lower portion of the breast. One of these was marked by severe constitutional disturbances.

## THE THORAX.

**Division of the First Rib in Apical Tuberculosis.** It is difficult to determine with accuracy the extent of a tuberculous process in the lung, or whether the bronchial nodes are involved. In view of this uncertainty, some of the more radical operative measures would seem to be too dangerous, but division of the first costal cartilage is an operation comparatively free from risk, and one which Seidel<sup>3</sup> believes may be useful in incipient tuberculosis by insuring better circulation and more perfect respiratory excursion. Freund demonstrated the existence of contraction in the upper portion of the thorax brought about by changes in the first rib or its cartilage, and the influence such a condition com-

<sup>1</sup> Deutsche med. Woch., December 19, 1908.

<sup>2</sup> Deutsche Zeit. f. Chir., September, 1908.

<sup>3</sup> Münch. med. Woch., June 23, 1908.



bined with diminished respiratory activity might have on the development of tuberculosis. To this factor must be added the disturbances incident to compression of the apical bronchus and those caused by the groove in the lung from pressure exerted by the first rib. Freund observed in many cases of healed tuberculosis that a joint had become established at the junction of the first rib and cartilage, and concluded that this had a distinct connection with the reparative process. His view was corroborated by the postmortem studies of Hart, who found this condition existing in an astonishing number of instances, and from these observations followed the application of surgical measures to assist in repair. The adoption of the operation may be recommended because of its simplicity and because, in the treatment of emphysema, it has been proved to be of some therapeutic value.

Kausch<sup>1</sup> divided the first rib in an adult female for the symptoms of a beginning apical tuberculosis. The operation was easily performed and well borne, although too short a time has elapsed since its report to draw conclusions as to its effects.

From anatomical studies and the experience gained from two operations, Seidel disapproves of rib resection, as for emphysema; he prefers simple division of the cartilage, with the interposition of muscle to favor the establishment of a false joint. The operation is indicated in both young and adult patients with narrowing of the apex of the thorax; in all cases of apical tuberculosis in adults, with calcification of the first costal cartilage and difficulty in movement of the thorax; in adults in whom the thorax is well formed, but whose pulmonary lesion does not respond to general measures.

Children and young individuals with incomplete development are not suitable subjects for operation, because the elasticity of the cartilage may have the same curative effect upon the process as a false joint. The method can be applied only to the most incipient cases, before the process has extended to the more dependent portions of the lung, for here, obviously, the operation would have no beneficial effect. Its application, therefore, calls for early diagnosis upon the part of the physician.

**Resection of the Sternum for Tuberculosis.** Resection of the entire sternum in order to drain tuberculous cavities in the lungs is almost a unique procedure; at least, Siegel,<sup>2</sup> in searching the literature, could find but one case similar to his own. Partial resection of the sternum may be indicated, particularly when the posterior surface of the bone is involved. The bone may be permanently resected, as for tumors of the sternum and mediastinum, or temporarily, as in operations for exposure of the heart or great vessels, in the operation of cardiomyelitis, and in case of osteomyelitis. Though regarded as difficult and dangerous, the operation should be

<sup>1</sup> Deutsche med. Woch., December 12, 1907.

<sup>2</sup> Münch. med. Woch., 1908, No. 25, p. 1340.

performed more frequently, especially in the treatment of caries, perhaps the most common lesion. As the affected area is usually on the posterior surface of the sternum, pus is found between the bone, and the intercostal muscular insertions. It is particularly difficult to determine in which direction the disease extends and how large a portion of the bone should be removed. The extent of the lesion may be ascertained by sounding and by observing the limits of the tuberculous granulation tissue.

In tuberculous caries of the sternum the prognosis is favorable, and the operation itself is well borne, although the wound may not heal for several months. During the operation one should avoid injuring the internal mammary artery, the pleura, and the pericardium.

Apart from the interest attached to the operation itself, Siegel's case is important because of the bearing it has upon pulmonary surgery in general. After the bone was excised he noticed a fistulous tract extending to a small cavity in the lung. He removed all the tuberculous granulation tissue, packed the cavity, and replaced the flap. After the operation the patient experienced some respiratory difficulty, which was probably due to the removal of the support to the ribs and diaphragm. The wound healed, however, and the patient gained rapidly in weight. In the treatment of certain cases of pulmonary tuberculosis with cavity formation, Siegel suggests the propriety of approaching the lesion by resection of the sternum, a suggestion which, while original, is open to criticism.

**Necrosis of the Costal Cartilage.** Infections of the costal cartilage or the perichondrium may be of primary or secondary origin. The most common cause, Ropke<sup>1</sup> states, is tuberculosis, in the form of a periostitis or osteomyelitis. The acute forms may be due to the pyogenic bacteria or to the typhoid bacillus, and if to the latter, the process begins at the junction of the cartilage with the bones and involves the fourth to the eighth ribs. The more chronic forms are due to organisms of the colon group, to the gonococcus, or to syphilis. Of Ropke's four cases, one followed typhoid fever, one influenza, one an infected fracture, and the fourth arose by extension from a suppurating wound. In all the cartilage underwent necrosis, followed later by the formation of circumscribed abscesses. Simple incision and curettage are usually insufficient to effect a cure; unless total excision is practised there is tendency to recurrence. Necrosis of the costal cartilage is very common in old age, at a time when the cartilage undergoes vascularization and canal formation.

**Acute Osteomyelitis of the Ribs.** This is a rare affection. One of the characteristic symptoms is rapid respiration, as high as 70 per minute; another pain, of a radiating character, probably due to irritation of the

<sup>1</sup> Arch. f. klin. Chir., Band lxxxvii, Heft 4, p. 970.



intercostal nerves. Fiedler<sup>1</sup> reports a case in a girl, aged eight years, who sustained an injury of the thoracic wall ten days before the onset of symptoms. These at first were obscure, in that there were no external evidences of inflammation, such as heat and redness. There was some bulging of the thoracic wall, and at this point drainage was introduced. The systemic infection was so severe that the patient died in fourteen days. The infection was due to the *Staphylococcus pyogenes aureus*; no portal of entry was discovered. The injury evidently caused a point of diminished resistance. Metastatic or secondary affection of the ribs is more common, especially so after typhoid fever.

**Thorax Resection in Chronic Empyema.** A very comprehensive review is found in Bergeat's<sup>2</sup> article on the subject of empyema. While he discusses both the acute and chronic varieties of the affection, he deals in particular with the latter. His findings may be summarized as follows:

1. In the majority of cases of chronic empyema, with or without the formation of a fistula, cure is to be obtained only by performing a thorax resection after the method of Schede.

2. The resection must be sufficiently extensive, otherwise numerous operations will have to be performed at a later period, a fact which greatly prolongs convalescence.

3. Repeated radical operations usually can be undertaken without hesitation.

4. The only contra-indications which require consideration are general weakness and a progressive amyloid degeneration.

5. Operation may be undertaken in chronic and extensive tuberculous empyema, providing the opposite lung and the general condition of the patient are sufficiently favorable.

6. In children extensive resection of the thorax should be undertaken as soon as possible, since a complete regeneration of the bones is to be expected.

7. Schede's operation in combination with decortication (Delorme) is the method of choice in cases with marked thickening of the visceral pleura.

8. Prior to operation, the intrathoracic condition should be thoroughly examined by all known methods of precision (physical, Röntgen examination, etc.).

In conjunction with this summary the author has analyzed the results in 135 cases of thorax resections, and finds that 114 cases occurred in the male sex, and most commonly during the second to fifth decade of life. The disease in 80 instances was situated on the left side, a predisposition which may be due to the position of the heart or the lessened volume of the left lung. The results in this series show:

<sup>1</sup> Münch. med. Woch., February 4, 1908.

<sup>2</sup> Bruns Beit., vol. lvii, p. 373.

	Cases.	Per cent.
Cure . . . . .	76	56.5
Improvement . . . . .	6	4.5
Fistula formation . . . . .	19	14.3
Unimproved . . . . .	2	1.5
Died . . . . .	31	32.2

**Recurring Pleural Empyema.** This term is used by Pryor<sup>1</sup> to describe a secondary involvement of a previously affected pleura, occurring at an indefinite time after recovery from the primary attack. The condition is very rare, as the author could collect but few cases from medical literature in addition to the case he observed. The secondary lesions are apt to be localized because of the obliterative effect of the first attack. The symptoms are so confusing that recognition of the condition is often difficult. The diagnosis was suggested in the author's case by the persistent daily rise of temperature, the continued absence of expectoration, increased leukocytosis, and the harassing dry cough so often due to pleural irritation.

The cause of these recurring attacks is difficult to explain, and Pryor merely offers the suggestion that microbic life remains latent in a pocket formed in the process of healing, and becomes more active under unknown irritants. Park<sup>2</sup> regards the condition as one analogous to bone infections, where, as is well known, the infection may subside, remain latent for long periods, and then develop as an apparently new attack.

In the case reported dense adhesions had formed above the point of drainage, walling off the upper part of the cavity, and numerous pockets were found among the adhesions. Postmortem examination of chronic empyemas frequently reveals a similar condition, so that it seems rather remarkable that recurrent attacks so rarely occur.

**Sudden Death in Pleurisy with Effusion.** Various theories have been offered to explain the sudden deaths in pleurisy, *e. g.*, thrombosis and apoplexy, but in a large number of cases the autopsy fails to reveal any responsible cause. In those cases of pleurisy with effusion, preceded by dyspnea, irregular pulse, and the general anemia that follows collapse of the venæ cavæ and heart, sudden death, according to Calvert,<sup>3</sup> is due to failure of the venous congestion to compensate for the constant variable hydrostatic pressure. He expresses his conclusions in the following: (1) Dependent as it is on one physical factor (pleural pressure), the venous pressure affords a reliable sign of the intrapleural pressure. Changes in the degree of venous pressure show the activity of the lesion producing the effusion, either increasing or decreasing, especially after the walls of the cavity are stretched. Maximum venous pressure heralds the approach of a period of unstable venous compensation, or the beginning of a failure of the veins to compensate. During this period the

<sup>1</sup> New York Medical Journal, December 21, 1907.

<sup>2</sup> Loc. cit.

<sup>3</sup> Johns Hopkins Hospital Bulletin, February, 1908.



patient is exposed to attacks of syncope, sudden death from changing position, or rapid rise of the pleural pressure. (2) During this period the position of the patient should not be needlessly changed—a horizontal position should be maintained. (3) Maximum venous pressure is a signal for immediate tapping. (4) The importance of the venous pressure suggests a general application of the methods for measuring venous pressure, to all cases in which venous congestion is present, for the purpose of determining the range of pressure in each pathological condition. (5) In cases of sudden death the clinician should remember the success which has resulted in cardiac stimulation, for a portion of these cases might be saved by such measures.

The first step is to reduce the pleural and increase the venous pressure. Turning the patient on the affected side and nearly in a perpendicular position would add to the venous pressure in the column of blood in the large veins. This change in pressure with the aid of heart stimulants might revive the heart. If, by these means, the heart begins to act, a few cubic centimeters should be removed from the pleural cavity. If too much fluid is removed the heart will not be able to do the increased work. As the heart is more liberally supplied with blood and its action becomes stronger, more fluid may be withdrawn. Repeated withdrawal of small amounts of fluid, until the venous pressure falls below the maximum pressure, should be the rule, therefore, at first; later, the fluid may be withdrawn in large amounts.

**Tumors of the Trachea.** Primary tumors of the trachea are believed to be very rare, although Krieg<sup>1</sup> has collected 201 cases, including 40 carcinomas, 21 sarcomas, 6 of unknown nature, the remaining benign. Sauer's<sup>2</sup> tables contain 29 cases of fibroma. Fibromas may be found at all ages, one patient was under two years, and one over seventy. The size of the growth varies from that of a small pea to that of a large walnut, and may completely obstruct the trachea. They develop in any portion of the trachea; occasionally springing from a bronchus they grow into the trachea, or they may be attached to the first tracheal ring. In nine cases death occurred from suffocation. The amount of disturbance depends on the size and location of the growth. There may be a feeling of a foreign body in the trachea, pain in the chest on coughing, hoarseness, asthmatic attacks, or dyspnea, but in a few cases there were no symptoms at all.

The treatment of benign tumors depends upon their location. This may be determined by the bronchoscope. Those high up have been removed through the mouth by forceps, others through a tracheotomy wound. Malignant tumors, with infiltration of the tracheal wall, cannot be removed through the bronchoscope. It is necessary here, even in

<sup>1</sup> Beiträge zur klin. Chir., lviii, No. 1.

<sup>2</sup> Interstate Medical Journal, June, 1908

early cases, to remove several of the tracheal rings. In Schmiegelow's case the patient remained well and free from recurrence for four and one-half years.

**Bronchoscopy.** The principal difficulties encountered in bronchoscopy, according to Ingals,<sup>1</sup> are: (1) Trouble in introducing the tube and poor illumination; (2) difficulty in following the lumen of the air passages with the bronchoscope; (3) respiratory contraction of the bronchi or even of the trachea in infants; (4) excessive secretion and the perplexity of searching caused by the flaccid and irregular walls of the lung; (5) the presence of pus, blood, or granulation tissue. The bronchoscope may pass beyond small objects, or they may be hidden by a collapsed or spasmodically closed bronchus.

Ingals thinks it possible that some of the cases of sudden and inexplicable death following bronchoscopy may be due to galvanization of the vagi. This danger is recognized in the treatment of esophageal strictures by means of electrolysis. The tube is near the vagi in one case as much as the other. To protect himself from shocks Ingals wears rubber gloves and shoes, and places his stool on a rubber sheet. The patient is partially protected by placing rubber castors on the table. Some experimental work has been done by Halsted<sup>2</sup> to determine the cause of inhibition of respiration during the passage of the gastroscope. The inhibitory process is due apparently to a reflex effect on the respiratory centre arising from irritation of the gastric mucosa, the vagi acting as the afferent pathways.

The value and usefulness of tracheal examinations by the bronchoscope is shown by Schmiegelow,<sup>3</sup> who reports a case of stenosis caused by the pressure of a substernal goitre. This condition was recognized by the bronchoscope and relieved by thyroidectomy. He also records certain instances of stenoses from tuberculous and syphilitic processes. Von Schrötter<sup>4</sup> demonstrated by direct examination, tracheal compression caused by a pleural effusion. The removal of the latter relieved the symptoms of tracheal obstruction, and incidentally excluded other possible causes. Stenosis of the trachea or bronchus is particularly liable to occur in pleural effusions in children because the tubes at this early age are more readily compressed.

The numerous reports of foreign bodies removed from the respiratory tract by means of bronchoscopy contain many suggestions as to the management of these cases. Thus, Jackson<sup>5</sup> advises that the patient be prepared for a tracheotomy when there are signs of dyspnea. The examination should not be undertaken unless one is prepared to do a

<sup>1</sup> Journal American Medical Association, March 7, 1908, p. 768.

<sup>2</sup> New York Medical Journal, August 15, 1908, p. 299.

<sup>3</sup> Hospitalstidende, January 8, 1908.

<sup>4</sup> Münch. med. Woch., January 28, 1908.

<sup>5</sup> Annals of Surgery, March, 1908, p. 32.



tracheotomy, since occasionally, unless relief is immediately afforded, patients would strangle. Franchere<sup>1</sup> recommends rest in bed for several days, in a warm, moist atmosphere after the extraction of the foreign body from the larynx. Cold compresses are applied externally for twenty-four hours, or until the symptoms of edema abate, and the patient is forbidden to use the voice for forty-eight hours. Among the interesting reports of foreign bodies removed from the bronchus is one by von Schrötter,<sup>2</sup> in which a piece of bone had been impacted in the bronchus for two years. Because of the presence of a mass of granulation tissue extraction was difficult. The bronchus, which beforehand was dilated, contracted to its normal caliber once the irritant was removed. Friedberg<sup>3</sup> extracted an eyelet which was embedded in a mass of granulation tissue around the false cord. Although the foreign body had been present for a period of two and one-half years, the patient complained only of hoarseness.

In 15 cases of bronchoscopy Eicken<sup>4</sup> found the foreign body in 12; it was absent in 2. In 11 of the 12 cases the foreign body was removed or coughed out through the bronchoscope. In but one instance did he fail to extract the foreign body, and on this occasion he was hindered by the inflammatory swelling. The sooner the foreign body is removed the less the danger of pneumonia. While the results have been uniformly good in early extractions, bronchoscopy is not necessarily contra-indicated in cases of long standing.

**Chronic Stenosis of the Trachea and Larynx.** In his treatment of 23 cases, Rogers<sup>5</sup> had 3 deaths, 2 failures, and 18 recoveries, although 2 wear intubation tubes. The most important factor in the treatment of hypertrophic laryngitis and of cicatrices of the upper part of the respiratory tract is long continued and continuous dilatation. The obstruction is overcome as the affected parts undergo pressure atrophy. To overcome the obstruction of either a hypertrophic laryngitis or a cicatrix, a properly made O'Dwyer intubation tube answers the purpose. It can be worn without harm for months or years. It should be remembered, however, that some patients with hypertrophic laryngitis may cough up any tube, and unless the tube is quickly replaced may strangle. Under these circumstances it is advisable to have a provisional opening in the trachea, even though this eliminates the possibility of a cure.

One case of hypertrophic laryngitis recovered after four weeks of tubage. Another of cicatricial stenosis required four years of continuous intubation. During the last two years the tube was not removed once, and has been out for six months with no sign of recontraction and with

<sup>1</sup> Journal American Medical Association, March 28, 1908, p. 1816.

<sup>2</sup> Berliner klin. Woch., December 23, 1907.

<sup>3</sup> Journal American Medical Association, January 4, 1908, p. 39.

<sup>4</sup> Deutsche med. Woch., September 23, 1908.

<sup>5</sup> American Journal of Medical Sciences, April, 1908, p. 575.

recovery of the voice. Other cases have required from three to six years before a cure was effected. A fibrous stricture requires about two years of continuous dilatation up to the full caliber of the normal lumen before it should be considered cured. It may even then recur and require from six to twelve months of additional treatment.

**Intrathoracic Newgrowths.** Neoplasms of primary origin within the thoracic cavity are uncommon; they are usually seen in the pleura, the lung, or the tracheobronchial lymph nodes. Glynn<sup>1</sup> reviewed autopsy records of 23 cases, among which were the following:

1. Hodgkin's disease with enlargement of the nodes, 4 cases.
2. Sarcoma of the axillary, cervical, and bronchial nodes, 4 cases.
3. Lymphosarcoma of tracheobronchial nodes, 7 cases.
4. Primary cancer or sarcoma of thymus, 2 cases.
5. Primary cancer of the lung or bronchi, 5 cases.
6. Myxosarcoma of the costal pleura, 1 case.

In the majority, or 16 cases, the nodes were involved, either primarily or secondarily. Pleuritic effusion was a frequent complication occurring in 7 of the 23 cases. Removal of the fluid affords little or no relief. When the bronchial nodes are involved, the symptoms are due largely to pressure on, or invasion of, the nerves, bronchi, vessels, and other structures in the mediastinum. Involvement of the nerves accounts for the fairly constant and radiating character of the pain. Cough, dyspnea, hemoptysis, fever, and signs of venous obstruction are all encountered.

The diagnosis of primary sarcoma of the pleura is difficult. In not a few instances the symptoms and physical signs in the early stage are those of a pleural effusion. Primary sarcoma of the pleura is by no means a common growth; one case was observed by Glynn, and others have been reported by Braun,<sup>2</sup> Mehrdarf,<sup>3</sup> and Robbins.<sup>4</sup> The last-named author could find records of only ten cases in which a correct diagnosis was made. The tumors sooner or later involve the surrounding structures, grow into the lung or the diaphragm, and may cause symptoms suggestive of some abdominal condition. Of course, in advanced stages, operative intervention is out of the question. The recent advances in thoracic surgery, however, promise to make these growths amenable to surgical treatment. An exploratory thoracotomy may make it possible to make the diagnosis in an early stage, and if performed under positive or negative pressure, may in the future prove to be unattended with much risk.

**Negative Pressure in Pulmonary Surgery.** Sauerbruch,<sup>5</sup> in his address before the American Medical Association, reviewed his experience in operations upon the thoracic cavity under negative

<sup>1</sup> *Lancet*, August 8, 1908.

<sup>2</sup> *Zeit. f. klin. Chir.*, 1908, No. 35, p. 108.

<sup>3</sup> *Virchow's Arch.*, 1908, cxci, 92.

<sup>4</sup> *Boston Medical and Surgical Journal*, May 7, 1908, p. 691.

<sup>5</sup> *Journal of the American Medical Association*, September 5, 1908.



pressure. He found that the method was particularly useful in removing large tumors of the chest wall. The first case operated upon in the pneumatic cabinet was one of sarcoma of the ribs. Experience has shown that the danger of these operations, especially when the pleura is involved, is lessened greatly under negative pressure, and that in the surgical treatment of mammary carcinoma more radical procedures, when the ribs and pleura are involved, are now justifiable. It is also possible, with the negative pressure cabinet, to operate with greater safety in cases of pulmonary emphysema and tuberculosis, and in the performance of cardiolysis, although every effort should be made now, as before, to avoid injury of the pleura. Even when the pleura is injured the apparatus will absolutely prevent the occurrence of pneumothorax. In the treatment of empyema one is not dependent upon the natural expansion of the lungs to obliterate the cavity when the operation is performed under differential pressure, artificial expansion of the lung expresses the exudate and prevents pneumothorax, while the tendency to shrinkage of the lung with subsequent scar formation is lessened considerably. All recent empyemas and a large percentage of the chronic ones heal quickly without the formation of a fistula; the patient is spared the tedious after-treatment and subsequent plastic procedures.

The diseases of the lung in which surgical treatment is particularly indicated and successful are gangrene and abscess; in fact, it is in the treatment of these conditions that lung surgery had its inception. It is only when the lesion is central that the operation becomes serious, but when performed under negative pressure the dangerous features are partially eliminated; pneumothorax is obviated, and the normal relations of the parts are less disturbed when the lungs are expanded. After the abscess is opened negative pressure prevents the entrance of foreign material into the healthy parts of the lung, and prevents the gravitation of blood and pus into the bronchi, not only during the operation but when the dressings are changed.

Sauerbruch reviews the advantages of his cabinet in the surgical treatment of bronchiectasis and carcinoma, in the surgery of the heart, in traumatic lesions of the lungs, and particularly in operations upon the thoracic portion of the esophagus. He found in his work on animals that after resection of the esophagus, anastomosis of the divided ends was best secured by the Murphy button.

Because of our shortcomings in the diagnosis of diseases of the thoracic cavity, exploratory thoracotomy should be resorted to more frequently. What is true of the abdomen is true also of the thorax; an exploratory operation will often clear up doubtful cases, as in foreign bodies of the lung where the Röntgen ray fails to make the diagnosis.

**POSITIVE OR NEGATIVE PRESSURE.** An effort has been made from clinical observations and experimental work to determine which method is the more scientific. At the recent meeting of the German Surgical

Association, this problem was discussed and many valuable suggestions were made. Küttner<sup>1</sup> has operated under positive or negative pressure eighteen times. His experience includes five resections of the chest wall, two operations for enchondroma of the ribs adherent to the pleura, one for a recurrent carcinoma of the breast, one for enchondroma of the vertebræ, three pleural operations, operations for tuberculous empyema, bronchiectasis, perforating wounds, and carcinoma of the lungs. Küttner's experience with both positive and negative pressure leads him to the conclusion that in many respects one is as good as the other. Brauer's positive pressure apparatus enables one to have at hand everything that might be required to meet emergencies without limitation of space and under more rigid aseptic conditions. While it is true that with Brauer's apparatus the anesthetizer is somewhat handicapped, the difficulties are soon overcome. Oxygen can be administered as required, and the degree of pressure can be changed almost instantly. The ability to change the pressure rapidly may be of advantage; thus in failing circulation the action of the heart may be strengthened at once by rapidly distending the lungs. So, too, an attempt to find the suspected lesion will often be facilitated by allowing the lungs to collapse.

To ascertain the relative advantages of the positive and negative pressure apparatuses in surgery of the lungs, Robinson<sup>2</sup> undertook an extensive series of operations upon animals, from which he has drawn many practical conclusions. He is convinced that at least for experimental laboratory work a positive pressure apparatus entirely obviates the necessity of the negative pressure cabinet. In his series of cases not a fatality could be ascribed to the use of positive inflation as such. Neither could he recognize symptoms after operation which could justly be attributed to the use of positive pressure. He calls attention to the objections raised by Sauerbruch, and endeavors to answer them. Interstitial emphysema of the lung as the result of in-pumping of air was not recognized microscopically. If the pressure is properly regulated the normal relation between the general and pulmonary pressure will be little disturbed. By the maintenance of positive pressure until the thoracotomy wound is closed, it has been possible to avoid the persistence of a pneumothorax. The great loss of heat is admitted, but has not caused any fatalities. The danger of infection of the pleuræ from the constant exposure to the air must be admitted. If infectious organisms are in the vicinity, however, it would seem difficult to exclude them even from a pneumatic chamber; with an air-tight mask a preliminary tracheotomy is unnecessary. Robinson experienced no difficulty in the administration of the anesthetic; the animals were evenly anesthetized and none were lost as a result of overanesthetization.

In thoracic operations upon animals Elsberg<sup>3</sup> found that respiration

<sup>1</sup> *Zentralblatt f. Chir.*, 1908, No. 35, p. 96.

<sup>2</sup> *Annals of Surgery*, February, 1908.

<sup>3</sup> *Medical Record*, May 23, 1908.



is best maintained when the animal lies on the abdomen, while with the animal on its back respiration was seriously impeded. This is due to the fact that the relatively weak anterior mediastinal septum receives more support when the animal lies on its belly. He found also that pneumothorax is better borne when the animals were deeply anesthetized. In operation upon the human this face-down position was insisted upon, and care was taken to have the patients deeply anesthetized at the moment the pleura was opened. In operations upon the lateral or posterior aspects of the thorax, the position did not interfere either with the operator or his assistants. Very little disturbance was observed upon opening the pleural cavity when the pleuræ were normal; and in his operations for empyema, with only one exception, there was none of the coughing and respiratory disturbance that one so often sees.

While the cases operated upon are but few in number, they would seem to indicate that there are decided advantages in operating upon these patients in the abdominal or face-down posture.

**Pulmonary Embolism.** Emboli of the pulmonary artery do not always cause instant death. In many cases fifteen minutes may elapse and at times the patient may live for hours. In such instances the embolus may remain in the right heart, may be loose in a branch of the artery, or be attached at its point of bifurcation and permit sufficient blood to flow by to maintain life. For the relief of this condition Trendelenburg<sup>1</sup> has devised an operation which he elaborated after a series of operations on animals and anatomical studies. He states in a later article<sup>2</sup> that the emboli can be removed by a comparatively simple and safe method, and without disturbing the heart's action. By a flap operation he exposes and opens the pericardium at the level of the third rib, taking care not to injure the phrenic nerve. Traction on a tube passed around the artery is sufficient to arrest the circulation. On opening the vessel a pair of curved forceps is introduced, if necessary, into the branches of the artery; if the embolus is felt it is withdrawn; the arterial wound is temporarily closed with forceps in such a way that the edges of the arterial wound project above the level of the forceps blades. The constricting tube is released and the circulation to the lung reestablished. The arterial wound is then closed with silk sutures, the forceps removed, and the operation completed with closure of the pericardial wound.

The practical application of Trendelenburg's operation is demonstrated by a case operated upon and reported by Sievers.<sup>3</sup> The patient was a woman, aged forty-eight years, who developed symptoms of pulmonary embolism while in the hospital. She was immediately prepared for operation, which was begun in twenty minutes from the onset of the attack. Two large clots were removed from the artery, and the wound in the latter clamped. When the second embolus was removed the

<sup>1</sup> *Zeitsch f. Chir.*, 1907, No. 44.

<sup>2</sup> *Zentralblatt f. Chir.*, 1908, No. 4.

<sup>3</sup> *Deutsche Zeit. f. Chir.*, 1908, xciii, 283.

patient took a deep inspiration, although the cardiac action was completely suspended, and was restored only after prolonged mechanical irritation. With the final closure of the arterial wound it was observed that the radial pulse had become palpable, but the face remained pale and cyanotic. The patient later returned to consciousness, complained of pain over the region of the heart, but after an injection of morphine obtained a refreshing sleep. In spite of an apparent favorable prognosis the circulation failed, and the patient died suddenly fifteen hours after the emboli were removed. The autopsy revealed a dilated heart, and the arterial suture intact; no additional emboli could be found.

In a second case recorded by Trendelenburg<sup>1</sup> the patient survived the operation thirty-seven hours, death being due to postoperative hemorrhage from the internal mammary artery. An embolus was discovered at the autopsy in one of the branches of the pulmonary artery. The two cases, however, demonstrate the fact that the operation is feasible in the human subject; to be successful, however, the surgeon must be familiar with the technique, the condition must be promptly recognized, and the necessary instruments should always be in readiness so that the operation may be undertaken without delay. Even in apparently hopeless cases the surgeon should not hesitate to at least make the effort to save the patient's life, and in most of these cases the situation will appear hopeless.

**Wounds of the Lung.** In the treatment of bullet wounds of the lung Küttner<sup>2</sup> is absolutely opposed to conservative measures. In most severe cases neither aspiration of the hemothorax nor a thoracotomy meet the indications. The rational method of procedure in all wounds of the lungs he maintains should consist in direct inspection of the seat of injury and the adoption of appropriate hemostatic measures.

In injuries of the heart we have become accustomed to radical procedures, but we have been woefully conservative in the management of similar lesions in the lung. To be sure, in wounds of the heart there is greater imminence of a fatal issue, whereas wounds of the lungs are regarded as of less importance because the majority recover if treated conservatively. Operations on the lungs until recently were always undertaken with the expectation of producing an operative pneumothorax; but since the institution of positive and negative pressure both pneumothorax and infection may be prevented. The author reports two instances: one in which the wound in the lung was closed, the second in which conservative measures were practised. The rapidity with which the first recovered with practically no postoperative complications, he uses as a strong argument for prompt surgical interference. He has collected five additional cases in which the wounds were sutured,

<sup>1</sup> Deutsche Zeit. f. Chir., 1908, No. 35.

<sup>2</sup> Zeitsch. f. Chir., August 8, 1908.



and of these the two to recover were operated upon under positive or negative pressure. The latter renders it very much easier to find and close the wound, and tends to prevent collapse, dyspnea, and infection of the pleura. Simple distention of the lung after the evacuation of the hemorrhagic effusion will not, in many cases, control bleeding. Spannaus, in his experiments on animals, endeavored to prove whether the collapsed or the distended lung bled more readily; his results show that a definite rule cannot be laid down.

In the case of stab wounds of the lung, Hotz<sup>1</sup> is equally positive as to the advisability of immediate interference. In his own case the patient recovered, though with a postoperative pneumonia and empyema. From the cases thus far operated upon it can be stated pretty positively that the period of convalescence in the majority is shortened by immediate suture of the wound. In a few days the lung expands, and if an empyema should develop the patient is in better condition to withstand the results of infection and a second operation. The likelihood of infection is less when the lung expands after suture. The prognosis is much more favorable when the sutures are introduced early; that is, before the inflammatory process is well established.

**Rupture of the Lung.** Le Conte<sup>2</sup> states that the physical signs of rupture of the lung without costal injury depend to a large extent upon the extent and the situation of the injury produced in the lung. The injury may be so slight that only a few capillaries and vesicles are ruptured. The diagnosis of such a condition by physical signs would be impossible, and unless complicated by infection and bronchopneumonia might pass unrecognized. If, as in some cases, the rupture of the lung substance is unattended with a pleural injury, there would be no pneumothorax, the air entering the loose areolar tissue from a broken bronchiole would dissect its way to the root of the lung, traverse the mediastinum, and appear in the neck as a crepitant tumor. In rupture of the lung with laceration of the visceral pleura, pneumothorax would probably be an immediate and prominent symptom. When laceration is very extensive, the symptoms of hemorrhage will be present in addition to those of the pneumothorax.

These various lesions of the lung may be produced in five ways: bruising, bursting, penetrating, compression of the lung, and tearing force. The symptoms are shock, dyspnea, interference with cardiac action, cough, and the physical signs of pneumo- and hemothorax, and emphysema.

The treatment of the condition for the most part should be symptomatic, absolute rest in such a position as is most comfortable to the patient, stimulation of the heart, and sedatives for the nervous system. When respiration is labored, as from pressure of the pneumothorax,

<sup>1</sup> Deutsche Zeit. f. Chir., xcii, 484.

<sup>2</sup> Annals of Surgery, March, 1908.

aspiration usually gives great relief and may be repeated from time to time. Strapping the chest has been recommended for the control of the pneumothorax, but its value, however, is questionable if not distinctly harmful, inasmuch as it decreases the capacity of the chest and at the same time can in no way control or overcome pressure exerted within the chest from the escaped air. If aspiration fails to afford relief a drainage tube should be introduced with or without the resection of a rib. This will enable one to remove the blood from the pleural cavity and tends to control hemorrhage from the lung. The three principal complications of this injury are bronchopneumonia, empyema, and gangrene. The mortality of the injury is about 75 per cent.

**Emphysema.** TRAUMATIC EMPHYSEMA. In a study of 52 cases of fracture of the ribs, König<sup>1</sup> observed 8 with serious involvement of the lung. Of three fatal cases only one death was attributable to general traumatic emphysema. This was in the case of a man, aged fifty-two years, who had had pneumonia four times on the same side as the fracture; an extensive operative interference was out of the question. Small incisions were made, which, while lessening the emphysema to some extent, were entirely inadequate. The advances which have been made in surgery of the thoracic cavity under the influence of positive or negative pressure, open up a field for the treatment of intrathoracic injuries. For example, in cases of traumatic emphysema, from a fracture of the ribs and subsequent rupture of the lung, König has shown that recovery will ensue if one operates immediately. Thus in a severe case of this description associated with a fracture of the trachea, immediate incision and a tracheotomy saved the patient's life.

In another instance a man, aged twenty-four years, was injured by a powder explosion; the second to the tenth ribs on the left side were fractured. A large subcutaneous air tumor was present, which rose and fell synchronously with inspiration and expiration. Under local anesthesia an incision was made to allow for the evacuation of air and blood. The muscles over the ribs were found torn, and the lung collapsed. The lung was drawn down and anchored with three sutures passed through its torn edge; the costal pleura and the cavity were tamponed. For several days there was severe hemoptysis and free exudation from the pleura, but within six weeks the lung was fully expanded and the patient made an uneventful recovery. The author, therefore, from his observations recommends immediate operation, preferably under local anesthesia, in these cases of advancing emphysema and pneumothorax due to fracture of the ribs. In every case the lung must be closely examined, the source of leakage discovered and sutured to the wound in situ, whether or not the lung is collapsed. This operation may be done to advantage under negative or positive pressure.

<sup>1</sup> Zentralblatt f. Chir., 1908, No. 35.



FREUND'S TREATMENT OF EMPHYSEMA. The cases of emphysema, operated upon by Freund's method, have been collected and summarized by Klemperer.<sup>1</sup> We have yet to decide several important points, namely, whether the first rib should also be divided as in Passler's case, whether the resection is to be limited to the costal cartilage or not, and, finally, whether both sides of the thorax should be operated on at the same time. In all four cases the condition of the patient was favorably influenced by the operation, although it will be necessary to wait for some time to see if the result is to be permanent.

Whether Freund's theory, namely, that the emphysematous condition of the lung is secondary to the rigidity of the thorax, is borne out by the operative results has not been proved. It will be necessary to study a large number of cases before this observation can be confirmed. There can be no doubt concerning the primary origin of the emphysema in cases of increased inspiratory and expiratory pressure, in bronchial asthma, bronchitis, or heart disease. But this does not exclude the cases which Freund refers to, especially the cases in which the dilatation and rigidity of the thorax act as primary factors. These cases are recognized by the existence of an emphysema, by dilatation of the thorax, by the characteristic deformity of the costal cartilage, and the exclusion of an expiratory obstruction.

MEDIASTINAL EMPHYSEMA. Mediastinal emphysema may develop during the course of whooping-cough, pulmonary emphysema or bronchitis, or as in the case of Friedrich,<sup>2</sup> in operations involving the lung, especially in the neighborhood of the lung hilus or by the escape of air from a bronchus unsuccessfully closed. Two cases under the author's observation, one an experimental study, the other occurring in his practice, developed a progressive mediastinal emphysema from the escape of air from a bronchus insecurely closed by a ligature. The ligature may become loosened by infection or as the result of decubitus on the bronchial wall. If perfect closure of the bronchus is secured, and if pneumothorax is prevented by operating under differential pressure and under strict aseptic conditions, unilateral amputation of the lung in animals should be well borne and without secondary infection of the pleura. Animals soon recover from the operation, gain in body weight, and the loss of one lung is more than compensated for. According to Friedrich's experiments not only the soft parts in the neighborhood of the defect, but the rigid chest wall as well play a part in the effort at compensation.

During the course of the operation on animals he observed a gradual transposition of the heart and the opposite lung toward the affected side. By the time the operation is completed the defect caused by the removal of the lung is diminished one-third through a vicarious emphysema of

<sup>1</sup> Therapie der Gegenwart, July, 1908.

<sup>2</sup> Arch. f. klin. Chir., Band lxxxvii, Heft 3, p. 647.

the remaining pulmonary tissue and by the change in position of the heart. The cavity is finally and completely obliterated, partly by the flattening of the ribs and partly by some elevation of the plane of the diaphragm.

**Chronic Abscess of the Lungs.** The indications for operative interference in chronic differ radically from those in acute abscess of the lungs, and the results of operation are much less favorable. Acute and chronic lung abscesses have very much the same relationship as a recent and an old empyema. An acute suppurative process in the lung is usually cured by incision and drainage; but in chronic cases such measures are insufficient. Perthes<sup>1</sup> states that while the indications in the acute cases are well known, the methods of procedure in chronic abscesses are more or less uncertain. Such abscesses, as a rule, are a sequel of the acute. When an acute focus of pus in the lung breaks into one of the bronchial branches, expectoration of the pus is not always followed by resolution. In some cases the evacuation is not complete; the pus rapidly re-accumulates and is evacuated. The abscess wall then becomes indurated and secondary foci develop in the vicinity of the primary lesion. The operative treatment consists in evacuation, drainage, and the prevention of a pulmonary fistula. The operation is best carried out in two stages: in the first simple evacuation without drainage and suture of the pleura; in the second, the abscess being now distended again with pus, free incision and drainage; the latter may be done without an anesthetic.

In chronic lung abscess there is usually a communication between the bronchus and the abscess, so that it is possible with the patient in certain positions to secure complete evacuation of the abscess through the bronchus. With the abscess cavity empty there is less risk in the administration of an anesthetic. Should it be necessary to resect one or more ribs, a general anesthetic should be employed. Abscesses, especially when deep-seated, are more easily found when they are distended; owing to the elasticity of the thorax wall, the cavity will not collapse, especially if the pleuræ over the abscess are thickened and spontaneous obliteration of the cavity is interfered with when the cavity becomes lined with epithelium, derived from the bronchi or from some of the remnants of the alveolar epithelium. When the abscess wall is not greatly thickened, healing can be brought about by destruction of the epithelial surface with the cautery. Garré removes the superficial layers of the abscess with a knife, unites the walls with sutures, and thus obliterates the cavity. This measure cannot be undertaken in many cases because the walls of the cavity are too widely separated.

Perthes mentions a chronic abscess of four years' duration in which a simple pneumotomy would have been insufficient, as the cavity was about the size of a fist, with rigid walls and partly covered with epithelium.

<sup>1</sup> Arch. f. klin. Chir., Band lxxxvi, Heft 4.



Furthermore, there was a communication between the abscess cavity and one of the bronchial branches. The entire abscess cavity was excised and a skin-muscle flap transplanted to cover exposed lung. The wound healed readily and without the development of a pulmonary fistula. The adherent pleuræ prevented a pneumothorax developing during the operation.

ABSCCESS AND GANGRENE OF THE LUNGS. The following table, published by Körte,<sup>1</sup> gives in detail the number and the results of his operations for abscess and gangrene.

	Total.	Healed.	Died.	Mortality per cent.
37 cases gangrene and abscess:				
Operation by pneumotomy . . . . .	28	20	8	28.5
Spontaneous healing . . . . .	1	1		
Putrid empyema following gangrene . . . .	8	1	7	
21 cases of bronchiectasis:				
Pneumotomy . . . . .	15	4	11	73.3
Incomplete operations . . . . .	2	1	1	
Putrid empyema following bronchiectasis . .	4		4	

Abscess or gangrene following pneumonia, in which the expectoration is purulent and the destruction of lung tissue not marked, should be treated expectantly, as many cases of this type recover spontaneously. Even though tissue remnants are expectorated a favorable result may be expected, providing there has been no putrid decomposition. After the expiration of a few weeks of unsuccessful treatment by palliative measures, operation should be resorted to. Cases with fetid expectoration, with or without tissue shreds, do not heal spontaneously, and in waiting there is always the danger of severe hemorrhage, of the process extending, of a secondary empyema, of metastasis, or of a fatal septi-cemia.

In *bronchiectatic cavities* we have a more difficult problem to deal with, because of the difficulty in determining the extent of the process. If an entire lung is affected the opening of one or more foci would be useless. The prognosis is of course very much better in the circumscribed than it is in the diffuse process, but in neither is the outlook so good as it is in acute pulmonary gangrene. The operation may involve an extensive resection to the chest wall, free incisions into the lung tissue, or even the resection of an entire lobe. Körte is inclined to operate in cases of severe hemorrhage, providing the lesion is circumscribed and can be recognized as such. In diffuse processes, as bronchiectasis, secondary hemorrhage will probably occur as the result of seeking for a torn vessel, difficult in this disease to find.

The above table shows the excellence of the results in the acute lesions; out of 28 cases 20 recovered (mortality, 28 per cent.), whereas in bron-

<sup>1</sup> Arch. f. klin. Chir., 1908, Band lxxxv, p. 1.

chiectasis the mortality was very much higher (73.3 per cent.). Körte performed his operations without resort to differential pressure; fearing aspiration of pus into sound areas in positive pressure, and believing negative pressure in these operations to be unnecessary.

**Pulmonary Gangrene Complicating Typhoid.** This affection is one of the rare complications of enteric fever. According to Miller,<sup>1</sup> gangrene in children is a much more common complication of measles, putrid bronchitis, pneumonia, tuberculous cavities, embolism, etc. The symptoms are those of the primary affection, in conjunction with the signs of general sepsis, fetor of the breath, putrid sputum, hemoptysis, and sometimes localizing signs in the lungs. Without operation, gangrene is almost invariably fatal, although spontaneous recovery occurs occasionally. The pulmonary symptoms developed in the case reported about the fourth day of the typhoid attack, and in three days' time the breath became very offensive and the prostration increased. Upon aspiration 350 c.c. of an offensive serosanguinolent fluid were withdrawn, and on the next day a thoracotomy was performed and the lung found to be friable and spongy. The patient survived the operation only three days.

**Mediastinal Abscess.** Acute suppurative inflammations of the anterior mediastinum can be classified according to their origin into those arising by extension (neighboring inflammations), the metastatic and traumatic. Of these the first group is by far the most common, the second less so, and is said to arise from such diseases as erysipelas, typhoid, pneumonia, acute articular rheumatism, etc. The very rare traumatic variety has been made the subject of a contribution by v. Saar.<sup>2</sup> The infection follows usually such injuries as stab wounds, or the application of blunt force to the sternum. In many cases there is also a fracture of the sternum, although the latter is not infrequently overlooked. After the accident a hematoma forms in the anterior mediastinum; the extent and position of the hematoma will depend upon whether or not the posterior sternal ligaments are intact. The hematoma itself may give rise to pressure symptoms, which in some cases prove fatal. Should the patient survive the effects of pressure, the hematoma may become infected and terminate in abscess formation.

The symptoms of abscess formation are a pulsating pain behind the sternum, often radiating to the vertebræ or anteriorly, fever, chills, and sweats. Too much reliance should not be placed upon the development of pressure symptoms. Other symptoms of diagnostic importance are the lessening of the area of dulness when the patient is changed from a sitting to a recumbent position, and in the early stages edema over the sternum alone or over the entire anterior surface of the thorax.

Once the diagnosis is made, the abscess should be opened and drained.

<sup>1</sup> Archives of Pediatrics, May, 1908.

<sup>2</sup> Beitrage. zur klin. Chir., lix, No. 1.



If localization is impossible by other means the precise seat of the abscess may be determined by exploratory puncture introducing the needle in the first, second, or third intercostal spaces near the sternum. Adequate drainage may be provided by resecting the costal cartilages or the edge of the sternum, and for several days after the operation the patient should be encouraged to lie upon the abdomen so as to favor drainage.

**Artificial Pneumothorax in Pulmonary Tuberculosis.** As an indication of the advances being made in the treatment of pulmonary tuberculosis, the production of an artificial pneumothorax by the injection of gases, serves as a conspicuous example. Judging from the number of contributions, which have appeared in the past year, the method is growing in popularity. The following directions should be observed: the gas must be introduced slowly, especially at the first injection. Schmidt<sup>1</sup> is inclined to use larger amounts than Forlanini originally advocated. The injections must be repeated until the pneumothorax is complete and the *x*-ray shows the lung completely collapsed. If adhesions between the parietal and visceral pleura render this impossible, the injections should be made at different levels in order that the spaces between the adhesions may be completely distended.

A pneumothorax should be maintained for at least a year. If the general condition of the patient continues to improve and fever and expectoration disappear, the injections should be discontinued, but the patient should remain under continuous observation. The time between the injections depends largely upon the *x*-rays and physical findings, generally every second and third day in the early stages, every eight to fourteen days later. It can be stated quite conclusively that the treatment is applicable only to cases with a unilateral lesion. Hemoptysis is not a contra-indication; in fact, when the lung is compressed this complication cannot well occur. Many cases which, prior to the production of a pneumothorax, bled freely, were entirely relieved by the compression; if hemoptysis persisted it implied that the pneumothorax was incomplete and that the lung had only partially collapsed. The greatest danger of artificial pneumothorax according to Brauer<sup>2</sup> is air embolism. The infiltrated and diseased lung tissue cannot escape the needle when the puncture is made; air enters and is carried to the left heart directly and then through the systemic circulation. This complication is prevented if the technique is carried out as advocated by its originators.

Spengler<sup>3</sup> reports six recoveries in ten cases of tuberculosis in which pneumothorax was induced. So advanced was the lesion in the majority of these cases that the author was convinced that without the aid of pneumothorax, resolution could scarcely have been expected.

<sup>1</sup> Beiträge klin. Tuberculose, ix, No. 3.

<sup>2</sup> Therapie der Gegenwart, June, 1908.

<sup>3</sup> Quoted by Bunzl, Grenz. Med. and Chir., 1908, No. 3.

Brauer<sup>1</sup> strongly indorses artificially induced pneumothorax, in properly selected cases. His experience comprises 1 case of severe hemoptysis, 1 case of gangrene of the lung, 4 bronchiectases, and 34 cases of phthisis; but of 60 patients he succeeded in inducing a pneumothorax in 45. In the first case a severe hemorrhage was controlled immediately, although death resulted later from a general miliary tuberculosis. The very chronic cases of bronchiectasis likewise have considerably improved; at times expectoration ceased, and the fetid character of the sputum entirely disappeared.

In the hands of different observers the number of favorable results is estimated as 22.7 per cent. When the number of unfavorable cases and the cases who refused to continue treatment are subtracted, this makes a very creditable showing. To obtain the best results cases must be carefully selected, and the treatment must be continued for a sufficient time.

PLEUROPNEUMOLYSIS IN PULMONARY TUBERCULOSIS. In certain cases the production of an artificial pneumothorax is impossible because of pleural adhesions. The treatment of unilateral tuberculosis by this method being rendered impossible, Friedrich<sup>2</sup> devised an operation by which the lungs are freed from their adhesions, permitting collapse of the cavity and diminishing the volume of the lung. The favorable outcome of the first case in which the operation was used was followed by equally encouraging results in subsequent instances. Of ten cases seven showed marked improvement while three died.

The operation consists in a resection of the ribs on the diseased side, the second to the ninth or tenth ribs being removed from their sternal insertion to the spine. Great care must be exercised in protecting the costal pleura, which is often quite fragile, for at this stage of the operation a pneumothorax would be dangerous. Particular emphasis is laid upon the danger in aspirating infectious material from diseased to sound lung tissue, both during and after the operation, upon the necessity of protecting the already weak heart from unnecessary strain, and upon obtaining primary union of the wound. The operation must be conducted with the patient in the correct position, as rapidly as possible, and with scrupulous asepsis. The temperature falls to normal soon after operation, expectoration and cough subside, sleep is less disturbed, and the patient gains in weight. According to Friedrich, the cases best adapted for the operation of thoracoplastic pleuropneumolysis are those with a unilateral distribution of the fibrocavernous type occurring in youth and early age, together with variable degrees of fever and without relief from other sources.

<sup>1</sup> Arch. f. klin. Chir., Band lxxxvii, Heft 4, p. 944.

<sup>2</sup> Zent. f. Chir., 1908, No. 35, and Surgeon-General's Office, December 1908



**The Pericardium.** PERICARDIECTOMY. The congenital absence of the pericardium, and the results of experimental studies led Parlavecchio<sup>1</sup> to conclude that pericardiectomy can be performed as a last resort in certain cases, and has some prospects of success. The operation, in which wide resection of the pericardium is performed, would be indicated in cancerous conditions involving the pericardial sac, and in chronic pericarditis. While there is always the possibility of the pleuræ becoming infected in the performance of a pericardiectomy, this complication is not as serious as the condition the operation is designed to relieve. The left phrenic nerve is sacrificed, but diaphragmatic movements are not interfered with in any way by its removal. During the operation great care should be exercised in avoiding injury to the auricles, great vessels, right phrenic nerve, and right pleura. With unilateral pneumothorax present, and one phrenic nerve cut, injury to the latter would prove fatal. Following removal of the pericardium in animals, few adhesions resulted; some of the dogs lived for months, all grew thin at first and developed hypertrophy of the left ventricle.

CARDIOLYSIS. The results of this operation have on the whole been satisfactory. Brauer's patient has remained well since 1902, and has been able to perform arduous work. The operation is best performed by the subperiosteal method of König.<sup>2</sup> If a dense scar exists between the heart and the periosteum, this tissue should be removed. In some cases, such cicatricial tissue does not exist, and it then becomes impossible to remove the periosteum without injury to the pleura, a dangerous complication in these cases.

Morison<sup>3</sup> advised operation in a case of *pericarditis* when improvement did not take place after medical measures had been carefully carried out. The operation was performed at a time when the heart muscle was still in good condition and degenerative changes had apparently not occurred. Accordingly, four and one-half inches of the fifth and five and one-half inches of the sixth rib were resected. The skin flap was sutured in place and drained at its lower external angle. After removal of the ribs, the heart appeared to beat evenly, its action not being limited by the surrounding structures. The wound healed by first intention, except at the point drained, where a little leaking continued for a short time.

The effect of the operation objectively and subjectively was very satisfactory. The space formerly occupied by the fifth and sixth ribs became soft and unresisting. On palpation a powerful cardiac systole was felt, but the other physical signs remained as before, although the exaggeration of carotid and suprasternal pulsation was less marked, and the blood pressure slightly reduced. The most gratifying result,

<sup>1</sup> Policlinico, August, 1908.

<sup>2</sup> Reported in PROGRESSIVE MEDICINE, March, 1908.

<sup>3</sup> Lancet, July 4, 1908.

subjectively, has been the diminution of anginoid pain, and particularly the ability of the patient to sleep with comfort.

Before leaving the hospital the patient was provided with a poroplastic shield to protect the exposed heart from accidental injury.

A second case is recorded by Urban.<sup>1</sup> The patient, aged twenty-two years, developed symptoms of pericarditis with failure of compensation. All medical measures had failed to give relief. The operation was performed with the hope that muscular degeneration might be arrested and the heart recover its tone. Urban resected subperiosteally portions of the fourth, fifth, and sixth ribs. During the operation the heart was most tumultuous, but the moment the sixth rib was divided its action became strong and regular. The postoperative course was uneventful. The patient was entirely relieved of his symptoms and could exercise freely and without discomfort. Examination of the heart revealed considerable diminution in its size, an indication that the ventricle had contracted and its muscular tonicity was regained.

**The Heart.** STUDIES IN RESUSCITATION. An important experimental study in this subject has been made by Pike, Guthrie,<sup>2</sup> and Stewart. They have concluded that chloroform has the most deleterious action on the heart, the A. C. E. mixture coming next in order, and then ether. The evidence corroborates the statement that chloroform acts very injuriously on the heart tissue. Morphine when used hypodermically, tends, as a rule, to make resuscitation less successful. Hemorrhage complicates the result. The absence of a sufficient volume of fluid in the circulatory system constitutes one of the difficulties of resuscitation attending death from hemorrhage. The authors summarized their experiments as follows:

1. Blood when defibrinated, soon loses its power to maintain the activity of the higher nervous centres and its nutritive properties, for all tissues quickly diminish.

2. Artificial fluids, as a substitute for blood, are unsatisfactory.

3. The proper oxygenation of the blood is indispensable in the resuscitation of an animal.

4. The heart usually continues to beat for some minutes after it ceases to effect a mercury manometer, and resuscitation of it within this period by extrathoracic massage and artificial respiration is sometimes successful.

5. Direct cardiac massage is the most certain method at our command.

6. A proper blood pressure is indispensable for continued normal activity of the heart.

7. Anesthetics, hemorrhage, and induced currents applied to the heart render resuscitation more difficult than asphyxia alone.

<sup>1</sup> Wien. med. Woch., 1908, No. 8, p. 395.

<sup>2</sup> Journal of Experimental Medicine, May 1, 1908.



The following case illustrates the complications which may arise during chloroform anesthesia, and is an instance in which massage restored the heart beat temporarily:

White<sup>1</sup> during an operation for popliteal abscess in which chloroform had been given for twenty-five minutes, was forced to perform *cardiac massage* by the subdiaphragmatic method. The heart was easily felt through the flaccid diaphragm. In one minute the heart responded to the irritation, a feeble tremor was felt at first, and soon rhythmical pulsations occurred. After seven minutes the apex beat was distinct and at the rate of 120 per minute. The abdominal wound was closed, and the operation completed. The patient died twenty hours after resuscitation, the symptoms and convulsions before death simulating a condition of acetonemia and acidosis.

**CARDIAC SUTURE.** I have been interested during the past five years in following very closely the development of the surgery of the heart. Cardiac suture and cardiac massage for resuscitation at first attracted much attention. Cardiac suture has become a recognized routine procedure in the treatment for wounds of the heart and I find in Matas'<sup>2</sup> article an interesting review of the subject from the most recent statistics.

To date 43.83 per cent. of recoveries has been secured in operative interference in 160 cases of heart wounds. In 134 cases in which the heart wound was sutured the percentage cured was 38.75 (49 recoveries). In 11 cases the heart was exposed, but not sutured, and 5, or 38.08 per cent., recovered. Foreign bodies were removed successfully five times. While the value of these statistics must not be overrated, it may be concluded that heart wounds, far from being invariably fatal, give three chances in four for survival long enough to permit of surgical intervention, one chance in ten of healing spontaneously, and one in two of recovery after direct suture. In the 49 recoveries recently analyzed by Rehn, in only a few was the convalescence uninterrupted and uneventful. In the majority of cases the postoperative course was critical at times or protracted on account of complications. Of the 75 fatal cases 16 died during the operation or within a few hours; 17 died within a few hours from shock and hemorrhage (40 per cent.), while 40 per cent. died from infection.

Better results can only be obtained by the adoption of methods which will eliminate as far as possible these three fatal factors, namely, shock, hemorrhage, and infection. As possible preventive measures Rehn suggests the following:

1. Diminution of shock by simplifying the technique of thoracotomy.
2. Better hemostatic measures to control bleeding during the introduction of the sutures.

<sup>1</sup> Maryland Medical Journal, September, 1908.

<sup>2</sup> Southern Medical Journal, August, 1908.

3. Exclusion of infection by scrupulous aseptic technique, by drainage of the pericardium and pleura, and by immediate obliteration of the pleural space by the expanded lung, thus preventing a pneumothorax.

The operable cases of heart injury can be divided into two groups: First, suspected or doubtful cases calling for exploratory pericardiotomy. In such cases the procedure used should be so directed that the exploration is simple and performed under local anesthesia, at least until the pericardium is opened. No complications should follow if the exploration should prove negative. The exploration should permit of exposure of the heart by extending its line of incision.

The second group presents a bleeding wound in the pericardial or parasternal region (60 per cent. of the cases). This directs one's attention to the heart, at once confirms the diagnosis even when, as is often the case, the symptoms point to an injury to the pleuræ. The intercostal incision of Spangaro is applicable in these cases, and has been largely adopted by the surgeons interested in cardiac surgery. Matas states that the method supplants all the complex osteoplastic thoracotomies previously used. The operation is performed as follows: After securing the mammary vessels, the intercostal space is increased by forcible retracting the ribs and costal cartilages; more space may be gained by carrying the incision upward along the chondrosternal junction.

Mention has been made<sup>1</sup> of the experiments of Rehn in which hemorrhage from the heart was controlled by digital pressure on the venæ cavæ. The entire surface of the heart should be inspected for bleeding points. The surgeon should remember that simple pericardiotomy, by relieving tension, will often control bleeding from a heart wound of small caliber.

Matas, after reviewing the evidence for and against artificial respiration, whether on the positive or negative principle, concludes that it is not required and may prove injurious in the first stage of the operation. In the terminal stages, however, it is of great value when the circulation and respiration begin to fail and when it is desirable to expand the lung.

Hill<sup>2</sup> reports three cases of wounds of the heart. In the first, the left ventricle was incised for a distance of three-eighths of an inch. The cardiac wound was closed with one catgut suture, and the pericardium with seven. A slight postoperative delirium developed during the convalescence. The second patient sustained an accidental wound by driving a needle into the heart, the foreign body entering the fifth intercostal space on the left side. With the pulsation of the heart, the head of the needle could be seen to move under the skin. Under local anesthesia the needle was extracted and the wound closed. No subsequent trouble was experienced.

<sup>1</sup> PROGRESSIVE MEDICINE, March, 1908.

<sup>2</sup> Medical Record, September 19, 1908, p. 473.



The third case showed on *x*-ray examination a piece of hat-pin embedded in the heart. The foreign body was easily located and removed.

Comparatively few bullet-wound injuries of the heart have been operated upon. Including Sultan's<sup>1</sup> case, 16 instances have been recorded, of which 7 recovered. As the condition of Sultan's patient grew progressively worse, from pressure within the pericardium, operation was resorted to without delay. Thirty hours after the injury was inflicted, upon opening the pericardium, about 200 c.c. of dark blood spurted out, and a wound 1.5 cm. in length with ragged edges was found at the apex of the left ventricle. The hemorrhage was controlled by digital pressure while the sutures were introduced. The pericardium was sutured with catgut, and a drain inserted under the osteoplastic flap. Complete recovery resulted. Sultan observes that experience has taught us a valuable lesson in regard to drainage of the pericardium; all five of the cases in which it was used resulted fatally, whereas four out of five in which it was not used recovered.

In PROGRESSIVE MEDICINE for March, 1908, 125 cases of cardiac suture were tabulated. To those cases, the four reported during the past year are added, and the whole series summarized as follows:

Operator.	Location and size of heart wound.	Results.
126. Hill, Med. Record, December 19, 1908.	Left ventricle, $\frac{3}{8}$ inch, pericardium not drained.	Recovery.
127. Ibid.	Probably left ventricle. Needle wound.	Recovery.
128. Ibid.	Location not stated. Pin wound.	Recovery.
129. Sultan, Deut. Med. Woch., February 13, 1908	Left ventricle. Bullet wound. $\frac{1}{2}$ cm. in length. Pericardium not drained.	Recovery.

	Cases.	Died.	Recovered.	Mortality per cent.	Recovered per cent.
Right ventricle . . . . .	44	30	14	70.0	30.0
Left ventricle . . . . .	61	30	31	49.1	50.9
Right auricle . . . . .	3	1	2	33. $\frac{1}{3}$	66. $\frac{2}{3}$
Left auricle . . . . .	3	1	2	33. $\frac{1}{3}$	66. $\frac{2}{3}$
Left apex . . . . .	6	3	3	50.0	50.0
Coronary artery . . . . .	1	1	—	100.0	
Septum . . . . .	2	1	1	50.0	50.0
Seat not stated . . . . .	9	5	4	55.5	44.5

	Cases.	Per cent.
Total number of cases . . . . .	129	
Number of deaths . . . . .	72	55.8
Number of recoveries . . . . .	57	44.2

<sup>1</sup> Deutsche med. Woch., February 13, 1908, p. 277.

# INFECTIOUS DISEASES, INCLUDING ACUTE RHEUMATISM, INFLUENZA AND CROUPOUS PNEUMONIA.

BY ROBERT B. PREBLE, M.D.

THE year which has elapsed since the appearance of the last chapter upon infectious diseases has not shown anything phenomenal, but there has been steady growth all along the line so that the year may be regarded as a satisfactory one. If there was no other reason for this than the increased confidence, based on enlarged experience, with the Flexner-Jobling serum for meningococcus meningitis, it would nevertheless have been profitable.

One new line of activity has been along that of the employment of toxins in the recognition of the nature of infections. This method has been applied not only to tuberculosis, but also to typhoid fever and diphtheria; but I am inclined to believe that this method, after a brief period of popularity, will prove too uncertain to be of value in the diagnosis of obscure cases, and will be forgotten as so many other methods have been.

The literature upon opsonins has grown at a furious rate without, however, any such improvement in the methods that one can have much confidence in the accuracy of the results, or hopes of their general application, to clinical medicine. It has drawn attention to the employment of vaccines of various sorts, in which there may prove to be much of value.

Increasing attention to the diffusion of infectious diseases is being given. This is well shown by the publication from the *United States Hygienic Laboratory of Bulletin No. 41* upon "Milk and its Relation to the Public Health," covering over 750 pages. Chapter II is given up to the consideration of milk as a cause of epidemics of typhoid fever, scarlet fever, and diphtheria, and many instances of each have been tabulated. No less than 138 epidemics of *typhoid fever* traceable to a specific infection of milk are tabulated. In 109 instances there is evidence of the disease having prevailed at the farm or dairy; in 54 the poison reached the milk by soakage of the germs into the well water with which the utensils were washed, or in some instances the intentional dilution with water which was polluted was admitted.

Seventy-four epidemics of *scarlet fever* spread through milk are tabulated. In 41 instances the disease prevailed either at the milk farm or



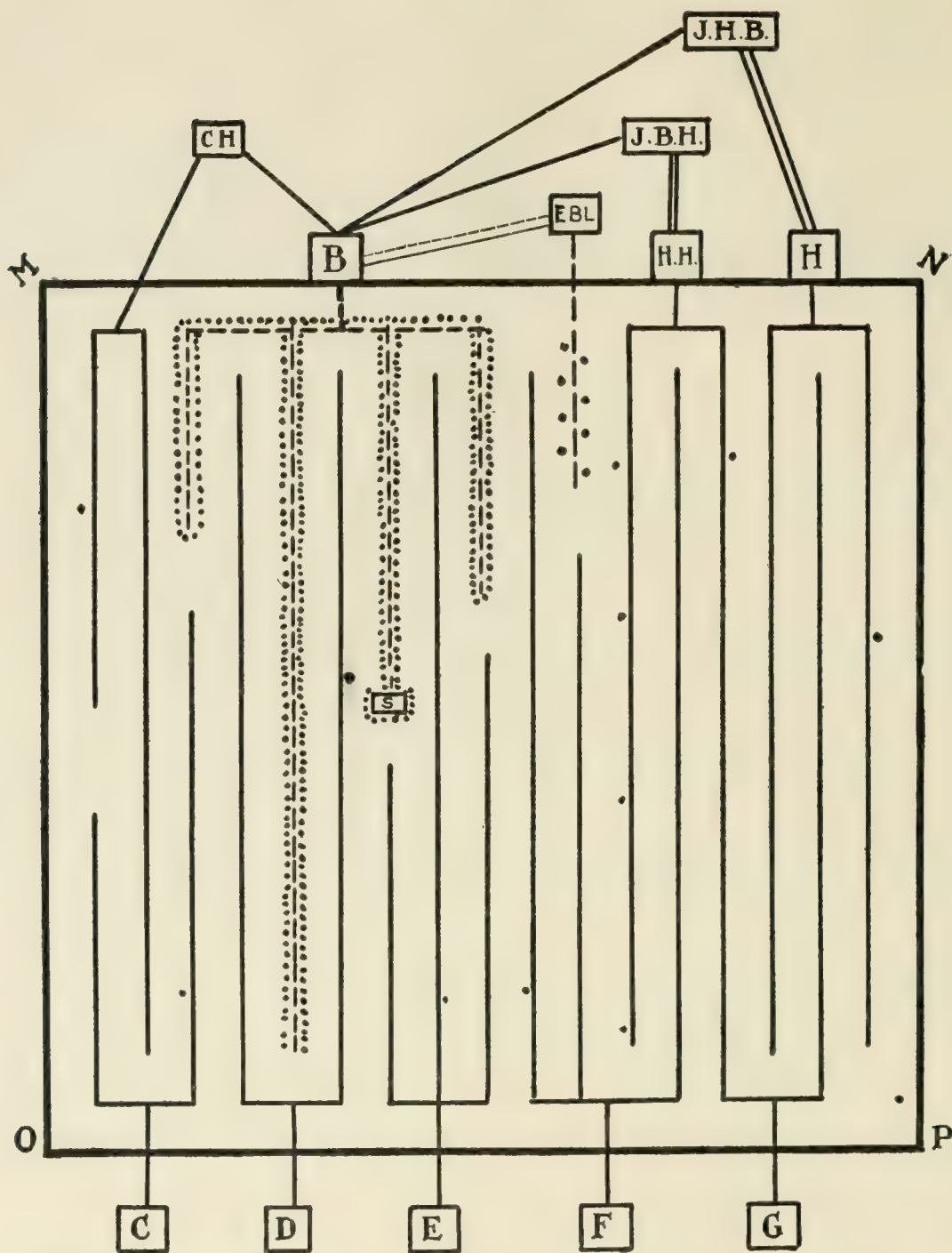


DIAGRAM 1.—Showing relation of milk routes to typhoid fever cases during the epidemic at Stamford, Conn., 1895. The large square M. N. O. P. represents the town of Stamford. B. is the dairy distributing the implicated milk, and the dash-lines running from B. into the city represent the milk route of this dairy. Each of the dots represents one case of typhoid fever and is placed upon the route of the dairy from which it was supplied with milk. There are 368 such cases on B.'s route, including the 12 around S., which is meant to represent the café supplied by B. B. supplied about one-eleventh of the milk used in the town. H. H. and H. are distributing dairies similar to B. C. H. and E. B. L. are producing farms selling milk to B. and also peddling some themselves. The dash-line extending from E. B. L. represents his personal route of five houses in which eight cases of typhoid occurred. J. H. B. and J. B. H. are producing farms selling milk to B. and also to distributing dairies H. and H. H. The double lines show the dairy to which the producer sold most of his milk. Dash-lines show the apparent course of the infective agent. C. D. E. F. G. are other dairies having routes in Stamford.—*Hygienic Bull.* No. 41.

dairy; in 20 the infection was attributed to disease among the milch cows. Various other methods also are mentioned.

Epidemics of *diphtheria*, 28 in number, are compiled in most instances due either to the presence of diphtheria at the farm or dairy or attributed to disease of the cows' udders.

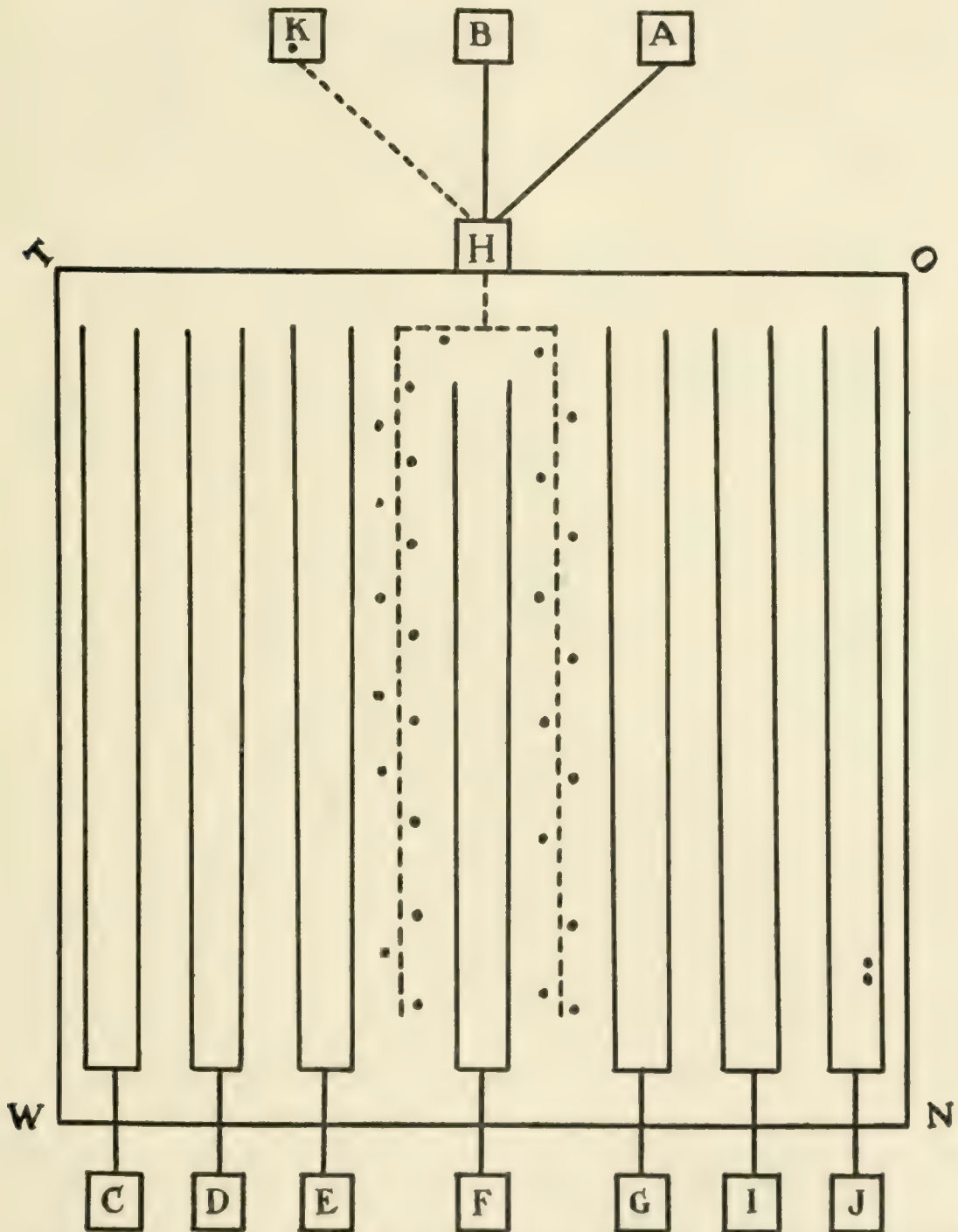


DIAGRAM 2.—Showing relation of milk routes to scarlet fever cases during outbreak at Norwalk, Conn., 1897. A., B., and K. are dairy farms selling their product to retail milk dealer H. K. is the farm on which a case of scarlet fever occurred antedating the outbreak in Norwalk. The large square T. O. W. N. represents the city of Norwalk. H. is the retail milk dealer among whose customers all cases but two occurred. The dash-lines represent H.'s milk route, and each dot is a case of scarlet fever. C., D., E., F., G., I., and J. are other dairymen having routes in Norwalk. The lines extending from them into the city represent their milk routes and are introduced to show their freedom from the disease.—*Hygienic Bull.* No. 41.



The following points of interest in reporting milk epidemics are given, and may prove of value to some:

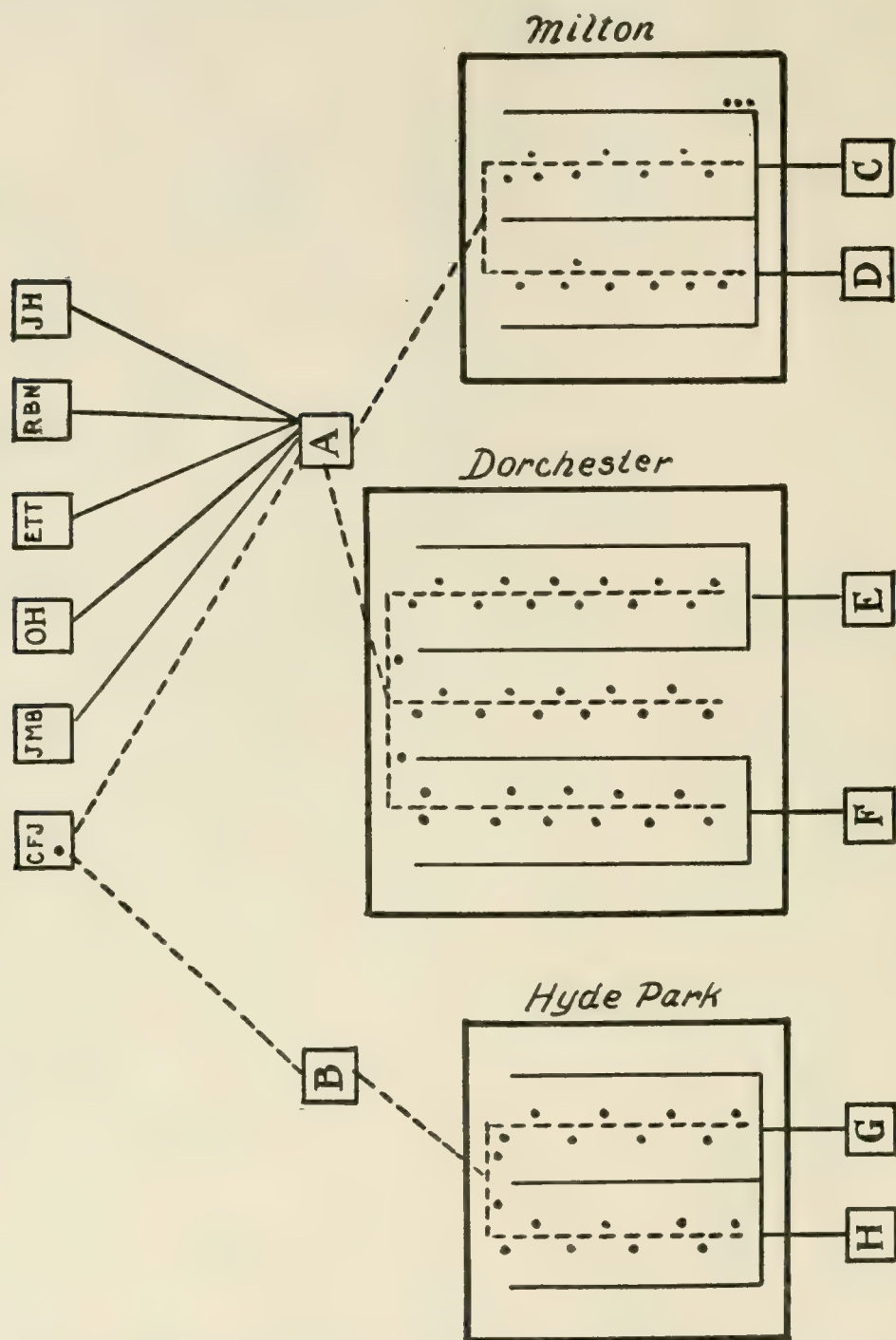


DIAGRAM 3.—Showing relation of milk routes to diphtheria cases during the outbreak at Dorchester, Milton, and Hyde Park, 1907. J. H., R. B. N., E. T. T., O. H., J. M. B., and C. F. J. are the farmers producing milk. A. is the milk dealer delivering milk in both Milton and Dorchester. B. is the milk dealer delivering milk in Hyde Park. The lines connecting the producing farms and the milk dealers show to which dairy the farmer sold his milk. The large squares represent Milton, Dorchester, and Hyde Park. The dash-lines extending from A. to B. into the towns represent the milk routes carrying the supposedly infectious milk. Each dot represents a case of diphtheria and is placed on the milk route from which it was supplied. C., D., E., F., G., and H. represent the other dairies selling milk. The lines extending from them into the towns represent their routes and are inserted to show their freedom from diphtheria cases.—*Hygienic Bull.* No. 41.

1. The number of cases of the disease existing in the involved territory during the time covered by the epidemic.
2. The number of houses invaded by the disease.
3. The number of invaded houses supplied in whole or in part, directly or indirectly, by the suspected milk.
4. The number of cases occurring in invaded houses so supplied.
5. The number of houses supplied with the suspected milk.
6. The relative proportion of houses so supplied to those supplied by other dairies.
7. The time covered by the epidemic.
8. The location of the case or cases from which the milk became contaminated.
9. The relation of the original case to the milk.
10. The time relation of the original case to the epidemic.
11. The special incidence of the disease among milk drinkers.
12. The elimination of the other common carriers of infection.
13. The effect upon the epidemic of closing the dairy or taking such measures as will eliminate the possibility of milk contamination from the suspected focus.
14. The finding of the specific organism in the milk.

The diagrams included with this article are so convincing and striking that some of them have been appended.

**Epidemic Cerebrospinal Meningitis.** This disease continues to attract universal attention, for while there is some decrease in the number of cases, it is nevertheless present quite generally over the entire civilized world. Its interesting clinical picture and its very high mortality are sufficient excuse for the attention given to it; but there is the additional reason in the existence of a serum which seems to promise much. The past year has only added to the hope offered by the Flexner-Jobling serum. The number of cases is not yet sufficient to warrant definite and final conclusions, but the cases have been so carefully studied and the results have been so uniform wherever the serum has been tried that the results have much greater weight than would be given by the same number of cases less carefully studied.

There still remain some problems of importance in regard to the disease. It is, for example, yet uncertain whether the disease should be included among the distinctly contagious ones. Examples which strongly suggest this possibility are fairly numerous, but are insignificant in their relative frequency when compared with such diseases as scarlet fever, measles, and the like. If contagious it would seem to be in the same group with pneumonia, a disease with which, as has been repeatedly pointed out in these chapters of *PROGRESSIVE MEDICINE*, it has so many and such fundamental resemblances. Renewed study of the relation existing between the meningococcus and the pneumococcus should be carried out.



Another yet unsettled point and one which formerly received much study only to be neglected this year, is the mode of entrance of the infecting agent. Much of the work formerly done on this point has proved to be of no value, because of insufficient differentiation of the meningococcus from the pneumococcus, micrococcus catarrhalis, and other similar organisms; the recent work is not sufficient to be convincing.

Still another important question is that of bacteremia. There are many things which strongly suggest that this disease is, like many other of the acute infections, a septicemia, and while numerous instances are recorded in which the meningococci were found in the blood, they make up only a small percentage of the whole. It is a matter which deserves careful study of a long series of cases by the best methods.

ETIOLOGY AND SYMPTOMATOLOGY OF MENINGITIS. Reports of *epidemics* observed in various cities have been printed, among which the following are noted. In each some points of importance are elaborated, but no new facts are given:

Browne, of Montreal,<sup>1</sup> has published some clinical observations upon 46 cases of epidemic cerebrospinal meningitis. In general his observations are in accord with those already quoted, but there are some points which he emphasizes; for example, he speaks of the suddenness with which the illness began in many (52 per cent.) of the cases, and of the initial symptoms, the two most common being vomiting and headache.

Chills were noted in 22 per cent. of this series, while chilliness without definite rigor was still more frequently seen.

He reviews the various symptoms and records the percentage frequency of each, finding them in general in about the usual proportion.

In a table given of the *complications* noted, one finds that otitis media and acute bronchopneumonia are the two most frequently seen (each 13 per cent.). Following this comes arthritis, acute pericarditis, cystitis, mastoiditis, acute endocarditis.

Arthritis occurred four times: three of these occurred in the knee-joint and one in the elbow. In one case the pneumococcus was cultivated from the pus of the joint.

Bennecke, in a report upon three sporadic cases of cerebrospinal fever observed in the Stintzing clinic in Jena, gives a table of *differential counts of the cells in the spinal fluid* obtained by puncture upon ten different occasions. In all of the specimens the neutrophile polymorphonuclear leukocytes made up from 80 to 99 per cent. of the cells found, while in one specimen the fluid showed 84 per cent. of small lymphocytes. This is a very peculiar observation, and if correct and confirmed in other cases is important.

The meningococcus was found in the spinal fluid of the three cases and in the blood of one of them.

<sup>1</sup> Montreal Medical Journal, 1908, pp. 37 to 98.

Blackader,<sup>1</sup> in a paper forming a part of a discussion upon this disease, reports that *lumbar puncture* was performed as a therapeutic measure in 30, of which 17 died, *i. e.*, a mortality of 56 per cent. He tabulates 74 cases observed in the Montreal Hospitals, with a mortality of 63 per cent. The mortality varied in different decades of age from 42 per cent. to 100 per cent., the lowest being in the second decade.

The influence of age, as an etiological factor, agrees with the figures pointed out by Claytor; 94 of the cases occurred in children up to fifteen years of age, 56 being under five years and 30 between six and eleven years.

Steiner and Ingraham<sup>2</sup> make a report upon the cases of this disease observed in Hartford, Conn., during 1904 and 1905. Of the 145 cases noted, 90 were in the months of April and May, 1904. The cases then gradually decreased in number and since 1905 have occurred only sporadically.

Fifty-five cases were observed in the Hartford Hospital, and lumbar punctures were made upon 51 of these. In 43 the meningococci were found during the epidemic, but 12 possible examples of contagion were noted.

The mode of onset was rapid in all but 7 of the cases, most of the school children affected retired in good health, to become ill with alarming suddenness during the night. The most constant symptom at the onset was headache, being noted in 27 cases and usually occipital. In 7 there was vomiting and in 6 distinct chills, 27 were unconscious on admission to the hospital, and 10 of them were wildly delirious; 27 of the cases showed varying degrees of retraction of the neck. *Kernig's sign* was present in 48 of 51 cases; herpes was noted in 16 instances, generally about the lips, but sometimes about the eyes, tongue, ear, neck, and back.

Petechia were noted in 28 cases; palpable spleen was noted but once. Paralysis of the eye muscles were frequently noted.

Nine cases had systolic murmurs over the cardiac area. In 3 instances this developed after admission to the hospital. These with 2 other instances were probably functional, but in 2 the murmur was due to mitral insufficiency, and in 1 of them fresh vegetations were found on the mitral valves at autopsy.

*Blood Examinations.* Leukocyte counts were made in 48 cases, 45 of whom were in the acute stage. The average of these counts was 29,555. The highest count was 70,000, and in but four cases was the count less than 10,000. A study of the course of the temperature leads to a confirmation of the old statement that the disease has no typical temperature curve.

Autopsies were performed upon 7 of the 37 fatal cases; but aside from the changes in the cerebrospinal system, no changes of importance were noted.

<sup>1</sup> Montreal Medical Journal, 1907, xxxvi, 761.

<sup>2</sup> American Journal of the Medical Sciences, 1908, cxxxv, 351.



Robb<sup>1</sup> has a review of 230 cases of epidemic meningitis. The epidemic began with an outbreak of five members of the same family, all taken sick within forty-eight hours. No further cases were observed for four weeks, when another family living at a distance was attacked with great suddenness, five members of the family being taken ill within ten hours.

It is customary to divide the cases into four groups: acute fulminating, ordinary, chronic, and abortive. To these four groups Robb would add a fifth, the mild.

Whatever the type of the disease the onset was practically the same, commencing suddenly with severe headache followed quickly by vomiting, rigidity of neck, back, and legs. Delirium was common and varied from a slight muttering to violent mania. The temperature varied greatly and proved of little value either as an aid to diagnosis or prognosis. Generally it rose early to 103° or 104° F., but in some of the most rapidly fatal cases it was normal or subnormal at entrance, rising before death to 105° or more, once even to 108° F.

The pulse rate also varied greatly. It was slow, full, and delayed in the most quickly fatal cases, while a rapid small pulse corresponding with the temperature is more common and a more favorable sign.

A purpuric eruption was seen in 20 per cent. of the cases and almost exclusively in the acute fulminating cases. Erythema and urticaria were common and herpes was seen in 39 per cent. rarely before the third, and usually not until the fourth day. It was present in 50 per cent. of those surviving until that day.

Rigidity of the neck was seen in all cases and continued well into convalescence, in the cases which recovered.

*Kernig's sign* was almost constantly observed.

Squint was present in 28 per cent. of the cases; purulent conjunctivitis a few times, as were also ulcer of the cornea and iritis.

Facial paralysis was seen in 11 cases, hemiplegia in 4, paraplegia in 1, and aphasia in 3; endocardial murmurs were frequently present, and pericardial friction was found in 17.

Of the 230 cases 162 died, giving a mortality of 70.43 per cent.

MORTALITY TABLE.

Age.	Cases.	Deaths.	Mortality per cent.
Under 1 year . . . . .	14	12	85.7
1 to 5 years . . . . .	45	35	77.7
5 to 10 years . . . . .	60	42	70.0
10 to 20 years . . . . .	63	39	61.9
20 to 30 years . . . . .	23	15	65.2
Over 30 years . . . . .	25	19	76.0
Total . . . . .	230	162	70.43

<sup>1</sup> British Medical Journal, 1907 xi, 1129.

DURATION OF ILLNESS IN FATAL CASES.

	Cases.
Less than twenty-four hours (shortest nine hours) . . . . .	9
Between 2 and 4 days . . . . .	43
Between 4 and 7 days . . . . .	38
Between 7 and 14 days . . . . .	29
Between 14 and 21 days . . . . .	7
Between 3 and 6 weeks . . . . .	13
Between 6 and 9 weeks . . . . .	7
Over 9 weeks (longest 4 months) . . . . .	16
Total . . . . .	162

With a mortality of 70 per cent. it is obvious that the methods of treatment were unsatisfactory; 79 cases were treated with Kolle and Wasserman's, Ruppel's and Burroughs' and Wellcome's sera, with a death rate of 74 per cent.

Most of the drugs recommended were tried without any satisfactory results. Some relief was given by morphine or opium. No good followed iodides, mercury, bromides, quinine, or salicylates. Frequent hot bat's gave great relief; occasionally marked improvement followed lumbar puncture.

Fritz Meyer<sup>1</sup> reports upon two patients in whom there was coincidentally a *pneumonitis* due to the pneumococcus and a meningitis due to the meningococcus ending in recovery. No one could deny the possibility of a mixed infection of this sort, but the chances of such a thing happening are small; it would seem natural to ask whether the two pathological processes were not due to the same organism, and the case again raises the question, Are the pneumococcus and the meningococcus separate and distinct organisms, or are they mere variations of the same. Cases such as these might be included among the clinical observations suggestive of the latter possibility.

The *influence of age* upon the causation and symptomatology of this disease has called forth two articles.

Claytor,<sup>2</sup> in an article upon the etiology of epidemic meningitis, collates a number of articles upon the age of patients suffering from this disease, and finds that the combined figures of Hirsch, Westenhoeffer, Frenche and Taves amount to 4584 cases, of which 78 per cent. were fifteen years of age or younger. The details given are insufficient to make further generalization than that the great bulk of these cases occur after one year and under ten.

Schlesinger<sup>3</sup> has been studying the occurrence of this disease in *people of advanced years*. He quotes Flatten, who found in 2916 cases only 11 between fifty to sixty years, 5 between sixty to seventy, and only 2 over seventy, *i. e.*, only 0.6 per cent. of all the cases are over fifty years of age.

<sup>1</sup> Charité Annalen, 1907, xxxi, 35.

<sup>2</sup> American Journal of the Medical Sciences, 1908, 214.

<sup>3</sup> Wiener medizinische Wochenschrift, 1908, lviii, 726.



Schlesinger happens to have had a number of cases in adults and older people, and believes that while in some cases the disease follows the course usually taken where the patient is young, in others it differs so much that one may speak of a senile type of the disease. The onset of the disease is slower, so that prodroma are common. Headache and vomiting frequently occur, while rigidity of the neck was often very incompletely developed. Kernig's sign appears early. In one case, a female, aged seventy, the disease began like an apoplexy. The patient became unconscious with moderate rigidity of neck and left-sided hemiplegia.

The sensorium is early clouded; coma may develop early, to be relieved temporarily by a lumbar puncture.

The pulse was not slowed, but became rapid and often irregular. Cheyne-Stokes respiration was noted three times.

Paralysis of one or more cranial nerves was noted in four of the five cases.

Herpes was present in all cases. The temperature ran lower than is usual with epidemic meningitis. The diagnosis, prognosis, and treatment are as with children.

Because of the nature of my work, opportunities for personal observation of this disease have been more numerous in adults than in children, and the cases have not appeared to differ essentially with the age of the patient, providing one makes allowances for the greater excitability of the cerebrospinal system in children. One might reasonably expect the generalized symptoms to be more marked in the young, but there is no reason why the focal symptoms, *i. e.*, the essential ones, should be different, and I must confess that the Schlesinger article does not convince me of any necessity of recognizing a senile type of the disease.

The symptoms of this disease are numerous and varied, so much so that any two cases may differ so much that one might fail at first sight to recognize that they are instances of the same disease.

**KERNIG'S SIGN.** In connection with cerebrospinal fever it will be worth while to make a note upon the conclusions which Morse<sup>1</sup> draws from a study of Kernig's sign in 2000 infants. He found this sign almost never, either in health or disease, except in meningitis. It is found so rarely in other diseases at this age that its presence in an acute disease justifies, as far as any one sign can, the diagnosis of meningitis. It is never present, however, in some cases, and in many others it is present only intermittently. It occurs with equal frequency at all stages of the disease. It has no apparent connection with the degree of intracranial pressure. It is of no value in the diagnosis between the tuberculous and cerebrospinal forms.

The point here upon which especial emphasis should be laid, is that

<sup>1</sup> Archives of Pediatrics, 1908, xxv, 167.

in infants Kernig's sign has much greater significance than it has later in life when it may be found not only in instances of meningitis, but in other, many other, conditions. But in this long series of infants it was found so rarely, except in cases with a meningitis, of one form or another, that its presence is almost conclusive and certainly so suggestive as to lead to the lumbar puncture for purposes of diagnosis.

**SKIN CHANGES IN MENINGITIS.** Dow has a careful review of 183 cases seen in the Belvidere Hospital, of Glasgow, in which the symptoms and course of the disease are carefully described. Particular attention is given to the changes in the skin. He speaks of the frequent appearance of goose skin in the chronic stages. The tache cérébrale was common throughout the disease. Only 33 of the 183 cases had a generalized petechial rash.

It is interesting to note that of late years the cases of epidemic meningitis do not conform to those which must have been common at the time when the disease was called spotted fever, for most observers, like Dow, have noted the comparative infrequency of petechia.

**EYE SYMPTOMS IN MENINGITIS.** Among the most important symptoms of this disease are those in connection with the eye. They appear early, are common and may easily be the first symptoms which suggest the nature of the disease from which any given patient is suffering. These symptoms are referred to in all text-books and articles upon this disease, but usually without clear statements as to their frequency. We are glad, therefore, to quote an article by Ballantyne,<sup>1</sup> who reports his observations upon the ocular symptoms in cerebrospinal meningitis observed in 73 cases in the Glasgow Fever Hospitals. While, as can be readily imagined, it was impossible in some cases to make a complete examination of the eye and its functions, eye symptoms were absent in but four cases, two of which were convalescent.

The only lesion of the eyelids observed was herpes of both lids of one eye in one acute case, but abnormalities of the palpebral fissure were noted in 17 cases. Retraction of the eyelids was noted in 15 cases, and in the most marked cases was sufficient to show the sclera both above and below the cornea. The cause of this retraction is obscure.

Blepharospasm was frequent, but Ballantyne is not inclined to regard this as due to photophobia, no instance of which was found among the cases examined. Spasmodic resistance to separation of the lids was almost the rule, but the patients could often be induced to open the eyes spontaneously and even submit to prolonged ophthalmological examination.

Hyperemia of the conjunctiva was noted in many cases, and acute catarrhal conjunctivitis with more or less purulent discharge was found in 13 cases. Usually this appeared in the early acute stage, but it may occur later.

<sup>1</sup> American Journal of Ophthalmology, 1907, 296.



Conjunctival hemorrhages were noted quite frequently early in the Glasgow epidemic, usually in the acute stage and even without cutaneous hemorrhages.

Abnormality of the pupils was the most common symptom, being absent in but 6 of 69 cases in which the pupils were examined. Irregularity was noted eighteen times and usually the reflexes were deficient. Dilated pupils were found in 34, contracted in 5, and normal in 26.

The light reflex was normal in 24, deficient in 26, absent in 7, and variable in 11. Contraction on near vision was good in 21, deficient in 15, absent in 7, and variable in 2. In 5 cases with deficient or absent reflex, there was a corresponding deficiency of the power of convergence.

Strabismus was found in 15 cases, and 8 others had a history of squint or diplopia. Conjugate deviation of the eyes was found in 4 cases; nystagmus was found seven times.

Double optic neuritis was found in 5 cases. In addition to these there were 9 cases in which the margins of the disks were blurred.

There are a number of statements which attract attention because they differ from the general impressions; for example, photophobia is constantly referred to as one of the common and earliest symptoms of this disease. The frequency with which the conjunctiva was found to be altered is in accord with general experience, but personally I am surprised at the small number of cases recorded of paralysis of the extrinsic muscles of the eyes.

The relative frequency of optic neuritis has been pointed out before, a fact which may aid in the differentiation of epidemic meningitis from tuberculous meningitis, in which optic neuritis is much more common.

Another, and to me quite new, eye symptom is recorded by Burville-Holmes.<sup>1</sup> He makes a brief note of *anesthesia of the cornea and conjunctiva* in cases of cerebrospinal meningitis. This is an interesting observation and should be confirmed. He believes that it occurs in about one-half of the cases and is found also in those who are perfectly conscious. He suggests that it may be an aid in differentiating this disease from others associated with meningeal symptoms.

URINARY FINDINGS IN MENINGITIS. Not much attention has thus far been paid to the urine in this disease, and only the changes common to infectious processes, such as concentration with the appearance in some of albumin and casts, have been noted during the past year. Campagna<sup>2</sup> has noted that the urine of children with cerebrospinal meningitis shows almost constantly an excess of indican, and that there is a definite and direct relation between the severity of the case and the amount of indican. A large amount of indican warrants an unfavorable

<sup>1</sup> Journal of the American Medical Association, 1908, 1, 280.

<sup>2</sup> Gazz. degli osp. e delle clin., August 4, 1907.

prognosis. The report covers 14 cases, all with considerable amounts of indican, and 11 of these died.

In addition to this it may be of interest to point out that the urine of the patient with the epidemic form of cerebrospinal meningitis shows an extremely low chloride excretion, lower than is seen in any other of the infectious processes except the pneumococcus infections.

OPSONIC INDEX IN MENINGITIS. Houston and Rankin<sup>1</sup> describe work in detail which they have been doing upon the opsonic and agglutinating power of the blood serum in cerebrospinal fever. The article will be found of interest to those interested in this theme, but it is sufficient to point out that they believe the opsonic method of great value in the diagnosis of epidemic meningitis.

TREATMENT. Bókay<sup>2</sup> reports upon 17 cases of this disease treated by systematic *lumbar puncture*; 7 of the cases died, and it is to be noted that the largest amount of fluid removed in the fatal cases was 30 c.c. and in some only a few drops, while in the 10 cases ending in recovery the smallest amount removed was 30 c.c. and the largest 450 c.c., and the average amount was 131.5 c.c. The number of punctures ranged from 1 to 14, with an average of 6.1. Of the 10 cases which recovered, 1 was left deaf and another deaf and dumb. Bókay thinks that in severe cases the puncture should be repeated from every day to once every three days. If the fluid is thick the results are not apt to be good.

Koch,<sup>3</sup> in speaking of his experience with systematically repeated lumbar puncture in the cases of epidemic meningitis, points out anew the difficulties one meets in forming an opinion of its value. In some cases the patients are improved, and may continue to improve only to end in death; in other cases the puncture brings about no lessening of the pressure symptoms. Koch is of the opinion that the puncture is of questionable therapeutic value. He is certain that no prognostic inferences can be drawn either from the character of the fluid nor its quantity. With this latter conclusion we can quite agree, but the former conclusion is not so certain. Certainly, all of us have seen patients subjectively better after lumbar puncture, and if one never got more than this out of this measure it would be worth while.

Ker,<sup>4</sup> in a general review of recent work upon this disease, speaks of having tried in 3 cases the suggestion made by Radinaun, namely, to *vaccinate* the patients with his own cerebrospinal fluid. Ker failed to obtain any result in the 3 cases, but states that 2 others appeared improved after the injection, and in all the opsonic index rose considerably. In none was there any inflammation at the seat of the injection.

*Serum Treatment.* Wasserman<sup>5</sup> briefly reports experience with the use of his meningococcus serum. There are reports upon 102 cases, but only

<sup>1</sup> British Medical Journal, 1907, xi, 1414.

<sup>2</sup> Deutsche medizinische Wochenschrift, 1907, 1947

<sup>3</sup> Therapie der Gegenwart, 1907, 535.

<sup>4</sup> Practitioner, 1908, lxxx, 66.

<sup>5</sup> Deutsche medizinische Wochenschrift, 1907, xi, 1585.



57 of these are full enough for use. Of these 27 died, a mortality of 47.3 per cent. Of 14 cases treated within forty-eight hours of the onset of symptoms 3 died, a mortality of 21 per cent. Of 7 treated on the third day 2 died, *i. e.*, 28.5 per cent. Seven cases were treated on the fifth day, with 2 deaths; 4 cases were treated on the sixth and seventh days, with 3 deaths (75 per cent. mortality). From this point on the mortality steadily increased.

Schultz<sup>1</sup> reports upon 64 cases of meningitis in the hospitals of Posen, 23 of which were treated by the Kolle-Wasserman serum in addition to the methods ordinarily employed in cases of this sort.

Of the 23 serum cases, 2 which recovered and 2 which died were not confirmed by bacteriological methods; both of these Schultz is certain were true cases. The serum was given subcutaneously in 10 c.c. doses to adults and 5 c.c. to children, and repeated in some cases up to four times.

It might be interpolated here that experience with the Flexner-Jobling serum would suggest that this method of use and the doses given may not be a test of the value of the serum. Of the 23 cases treated, 13 died, *i. e.*, a mortality of 56.5 per cent. The mortality among the 41 cases receiving no serum was 53.7 per cent., so that one can agree only that in this series the serum was without effect.

Schultz points out that Wasserman finds encouragement for further trials of the serum in the fact that, according to his statistics, 35.1 per cent. of cases receiving serum in the first week died, 55 per cent. in the second week, and 81 per cent. in the third; while Schultz finds that of his cases which were treated without the serum, 35 per cent. died of those in whom the treatment began in the first week, 50 per cent. in the second, and 100 per cent. in the third.

Schultz concludes that the Kolle-Wasserman serum is not an effective therapeutic agent, but, as already stated, his method of using it may have been faulty.

Raczynski,<sup>2</sup> after commenting upon the futility of ordinary therapeutic agents in the treatment of epidemic meningitis, although admitting that the use of warm baths and the systematically repeated lumbar puncture in mitigating certain of the symptoms, goes on to relate the results obtained by him with the Jochmann serum.

It will be recalled that Jochmann looks upon his serum as having bactericidal properties and as making the meningococci more susceptible to phagocytosis. He has reviewed the results in 17 cases which received the serum by intraspinal injections. Three of these were already in a hydrocephalic state; of the other 14, 9 recovered, 2 died, and 3 were yet under observation.

<sup>1</sup> Berliner klinische Wochenschrift, December 30, 1907, 1671

<sup>2</sup> Wiener klinische Wochenschrift, 1907, 1641.

Schöne was led to use the same serum upon 30 cases, and had a mortality of 22 per cent., while the mortality in cases not so treated was 53 per cent.

Raczynski injected 9 cases, but the results are not so favorable, for 6 of the 9 died, and he was not able to convince himself that the other 3 cases were helped in any obvious manner by the use of the serum. At any rate he saw other cases, in which the serum was not used, because of insufficient supply, do as well as the 3 which recovered.

Probably the most important work on serumtherapy in epidemic meningitis is that of Flexner and Jobling. A full account of their work, and that of others who have employed their serum in this country, will be found in *PROGRESSIVE MEDICINE* for December, 1908, p. 262.

**Diphtheria.** SKIN REACTION FROM DIPHTHERIA TOXINS. The number of articles upon this disease is by no means so large as it has been in former years, and most of them contain little that is new. An article by Schick<sup>1</sup> contains some interesting experimental work upon cutaneous reactions with diphtheria toxins, using a  $\frac{1}{10}$  dilution of concentrated toxins, in the manner in which the cutaneous tuberculin test is made.

Of 22 patients with diphtheria, tried before they were injected with antitoxin, 18 gave a distinct reaction, 3 slight, and 1 negative. In the positive cases the cutaneous reaction is exactly like that obtained with tuberculin, with this important exception; suppuration is much more frequent, although every care was taken to avoid secondary infections.

The reaction is specific, for if the toxins before inoculation are neutralized in vitro by a sufficient amount of antitoxin, no reaction occurs; nor is there any if the child is given the antitoxin twenty-four hours before the inoculation, nor if a sufficiently large amount of antitoxin is given at the same time that the inoculation is made.

Among 95 children, suffering or convalescent from diseases not caused by the diphtheria bacillus, a positive reaction was obtained in 36. These cases Schick explained upon the theory of Wasserman, that with age the organism forms antibodies, and that when these are present in sufficient amounts the reaction does not take place, and that one may infer from the reaction, in one who is not infected with the Klebs-Loeffler bacillus, a less than normal resistance to such infection.

It cannot be claimed that this work has any great practical bearing, but it may serve to throw some side light upon questions of immunity and upon the biological reaction of animals to infection.

**DIPHTHERIA SEPTICEMIA.** Mahler<sup>2</sup> describes a further case of systemic infection with the diphtheria bacillus. This makes the fourth so far recorded, but it differs in that there was an accompanying streptococcus septicemia.

<sup>1</sup> *Munchener medizinische Wochenschrift*, 1908, 504.

<sup>2</sup> *Berliner klinische Wochenschrift*, 1907, xliv, 1499.



Uche<sup>1</sup> also reports a case of Klebs-Loeffler bacteremia.

Such cases as these are extremely interesting as exceptions to the general rule that diphtheria is a local infection, with systemic intoxication.

**LEUKOCYTOSIS IN DIPHTHERIA.** Karsner<sup>2</sup> has counted the leukocytes carefully and repeatedly in 13 cases of diphtheria, making both absolute and differential counts. All of the cases showed a leukocytosis ranging from a minimum of 14,400 to a maximum of 29,800. The day upon which the first count was made does not seem to influence the count, nor could Karsner make out any relation between the amount of the exudate and the degree of leukocytosis, although Ewing states that the leukocytosis frequently corresponds to the extent of the local lesion.

The influence of temperature on the degree of leukocytosis is not evident either in individual cases or in the series.

The effect of antitoxin upon the leukocyte count varied; in 6 cases it rose, and in the other 7 it fell; but there is a general tendency to the final drop of leukocytosis after the entire dosage has been given. Whether or not this is due to the antitoxin only is not obvious, but it is well to recall that Billings presents a series of cases, not given antitoxin, which showed during the course of the disease the same general fall in leukocytes.

The polymorphonuclear cells ranged between 75 and 79 per cent. in most cases, but in isolated instances ran down to 69.2 per cent., or up to 87.6 per cent.

Eosinophiles were found in only 7 of the 13 cases at the primary count, and of these 5 showed less than 1 per cent. after the first dose of antitoxin; the percentage and absolute number of eosinophiles was diminished in 6 cases, increased in 3, and unchanged in 4.

In regard to the myelocytes, Karsner found them in eight counts only and these in but 4 cases. This is in accord with the reports of all writers except Engel, and warrants the conclusion that myelemia is not an ordinary part of the hematology of diphtheria.

**PHAGOCYTOSIS IN DIPHTHERIA.** Royer, Weston, and Clark<sup>3</sup> have endeavored to determine (1) the action of human phagocytic cells toward the diphtheria bacillus as we meet with this organism in various stages of diphtheria, uninfluenced by serumtherapy; (2) to continue the study of this activity toward the Klebs-Loeffler bacillus in the same patients after treatment by diphtheria antitoxin; (3) to note the activity toward the pneumococcus and streptococcus by phagocytic cells from the same patient under the same conditions; (4) to note whether diphtheria antitoxin, in the doses and the intervals now common, promotes the maximum phagocytosis toward each of these organisms; and (5) if change in

<sup>1</sup> Centralblatt f. Bakteriologie, 1908, xlv, 292.

<sup>2</sup> University of Pennsylvania Medical Bulletin, 1908, xxi, 222.

<sup>3</sup> Journal of Medical Research, 1908, xviii, 107.

phagocytic activity be found under serum treatment to determine its cause.

It is unnecessary here to review the details of their work, and it is sufficient for present purposes to note the conclusions drawn:

1. The blood of normal individuals shows practically no phagocytosis toward the diphtheria bacillus.

2. The blood of patients ill with acute diphtheria shows an active phagocytosis toward this organism.

3. Phagocytosis appears to reach its maximum about the fourth day of diphtheria in those untreated with serum.

4. Diphtheria antitoxin has no constant effect on phagocytosis or leukocytosis.

5. Phagocytosis toward the diphtheria bacillus shows no particular variations in patients of differing ages or races.

6. Diphtheria antitoxin has no effect on the activity of the phagocytes toward streptococci or pneumococci.

HERPES IN DIPHTHERIA. Among the less frequent symptoms which may occur with diphtheria are changes in the skin, and it is therefore interesting to note an article by Rolleston,<sup>1</sup> who makes a report upon herpes facialis in diphtheria, during the course of which he quotes freely from an article by Orsi, which I am unable to obtain. Orsi analyzed 2400 cases of diphtheria and found herpes labialis in 2.45 per cent. of them, while Rolleston found this eruption in 4.01 per cent. of 1370 cases confirmed bacteriologically. In the great majority of the cases the lips alone were affected, but the herpes appeared also upon the cheeks, chin, and nose. No case of herpes zoster was seen.

Rolleston found the eruption increasing in frequency up to the twentieth year, while Orsi found it most often in children between four and five years of age. The herpes was commonest in the coldest months. It is almost invariably an early symptom, only once in Rolleston's series appearing after the first week, usually appearing about the third or fourth day.

Since the herpes was found in 4 per cent. of the cases, it cannot be regarded as rare in diphtheria, although this eruption is not so common with this disease as with non-diphtheritic angina.

Among the nine acute infectious diseases, in which figures relating to the frequency of herpes facialis are available, diphtheria may be ranked sixth, and be assigned a place between typhoid and typhus. Lobar pneumonia, malaria, and cerebrospinal meningitis, in each of which herpes labialis occurs with a frequency of about 40 per cent., leads the way.

Has the herpes any prognostic significance in diphtheria? Sauné and Baginsky think not, having seen it in both severe and mild cases. Orsi

<sup>1</sup> British Journal of Dermatology, 1907, xix, 375.



regards it as a favorable sign, while in Rolleston's series its frequency was greatest in the severe forms of diphtheria.

Both Rolleston and Orsi seem to me to have overlooked the most important aspect of this matter, namely, the bearing of mixed infections upon the development of herpes. Of the organisms most often associated with the diphtheria bacilli, as obtained on cultures from the throat, is the pneumococcus. Rolleston is familiar with the fact that herpes is very common with lobar pneumonia, but the fact is not so generally appreciated that this eruption is equally common in all forms of pneumococcus infection, independently of whether the lungs are involved or not.

Blood cultures made in cases of this sort would show pneumococci in a very considerable percentage—quite as high as with the lobar pneumonia.

**THE PULSE IN DIPHTHERIA.** Peter,<sup>1</sup> in an article upon irregularity of the pulse in diphtheria, confirms the work to which reference was made in *PROGRESSIVE MEDICINE*, namely, that in most cases the irregularity was simply an exaggeration of the physiological pulsus paradoxus, and that such an irregularity is in no way peculiar to diphtheria. It is more common in the youngest children. Peters found it in 100 per cent. of the patients with scarlet fever and with diphtheria who were between the ages of one and five. It becomes progressively less and less common as the patients are older.

True irregularity of the pulse in non-fatal cases is very exceptional, but occurs in about one-half of the cases ending in death. It must, therefore, always be regarded as a very grave sign. It is the result of myocarditis, which, as Aschoff and Tawara pointed out, is found only with diphtheria. In cases of scarlet fever, measles, tuberculosis, etc., no alteration worth mentioning was found. "In typhoid fever in particular we practically failed to find any interstitial reaction contrary to the published statements with regard to the frequency with which myocardial alterations occur in typhoid."

These statements in regard to the myocardium are so different from those made by most clinicians who have studied this matter, that they cannot be accepted without question and serve only to reopen the debate.

**NASAL DIPHTHERIA.** No form of diphtheria is more serious than that beginning and confining itself to the nasal mucous membrane. This is not at all because of the location of the infection, but because such cases are so frequently misinterpreted, both by the family and the physician, as simple "colds." Thus the time during which the anti-toxin has its specific powers is allowed to slip by, and it is only after three or four, or even more, days that the true nature of the infection is recognized. For this reason the following observations are of importance;

<sup>1</sup> *Lancet*, 1907, xi, 767

Stimson,<sup>1</sup> in an article upon primary nasal diphtheria, describes the symptom complex essentially as follows: Without apparent cause the child, usually between the ages of two and seven, develops what is ordinarily taken for a "bad cold" in the head. The onset is insidious; there are few constitutional symptoms and the temperature is normal or only slightly elevated. The child does not feel sick and usually mingles freely with other children. There is a decided tendency to chronicity, and it may be this which first causes a suspicion that the case is more than a bad cold. The discharge varies in amount and character. It may be scanty or abundant, thick or thin, serous, bloody, or purulent, and may contain membranous shreds. The nasal vestibules and upper lip may be excoriated. Examination of the nose may show a purulent discharge only, or a membrane may be found. The glands of the neck may be swollen, and while any of the complications common to the pharyngeal diphtheria may develop, they usually do not, and the prognosis is good.

The sociological importance of such cases is obvious, for they can be the source of many other cases. The diagnosis can be made only by cultural methods.

One must not forget that these cases must not be confused with the cases in which the nose becomes involved by extension from the pharynx. Such cases are always most grave and the prognosis is always bad, though fortunately not so bad as in the days of Trousseau, who said that he never saw a case of nasal diphtheria recover.

ENLARGEMENT OF THE LIVER IN DIPHTHERIA. Fisher<sup>2</sup> writes an article upon some complications of diphtheria, which are perhaps not so important as they are interesting. He first mentions the case of a child with a much enlarged liver and gallop rhythm of the heart, developing after diphtheria. It was thought that the enlargement of the liver was secondary to heart weakness, and this proved to be so, for it disappeared when the heart improved.

Such enlargements of the liver after diphtheria are not frequently noted, but Fisher found it in 8 of 26 autopsies upon patients dying of diphtheria. The enlargement seems to be due not to fatty degeneration, but to general congestion, red blood cells between the columns of liver cells being greatly increased.

Another not uncommon postmortem finding is *disease of the arterial vessels*, either the aorta or smaller arteries. This is true not only of diphtheria but of other infectious diseases, and the changes occur in individuals of all ages.

Fisher also speaks of the occurrence of *intracardiac thrombosis* with secondary embolism, and of the interlobular emphysema and gangrene of the lung.

<sup>1</sup> New York Medical Journal, 1907, lxxxvi, 1123.

<sup>2</sup> Practitioner, 1907, lxxix, 502.



DIPHTHERITIC PARALYSIS. Chéné<sup>1</sup> publishes a carefully prepared article upon diphtheritic paralysis, covering the subject thoroughly. Among the etiological factors he points out the fact that paralysis occurs relatively more frequently among the adult than among the infantile cases. The frequency with which paralysis occurs varies according to different authors, but Chéné thinks 23 per cent. about the correct figure.

Paralysis may develop no matter what the location of the infection may be—in pharynx, nose, vulva, eye, etc.—but in the majority of the cases there is a relation between the site of the diphtheria and that of the paralysis.

The date of the appearance of the paralytic symptoms varies, often appearing early in the severe infections and later in the milder cases. It is most often about the eighth to the fifteenth day, rarely appearing later.

The paralysis may be localized or generalized, but the former is much the more common. It may affect any group of muscles, but most often those of the pharynx or eye. Along with the motor paralysis is a loss of sensation.

Recovery is usually complete in from ten to twenty-five days, but it may be delayed for a month or, exceptionally, even for two months.

A more or less generalized paralysis is less common, and may take the form of a monoplegia, hemiplegia, or paraplegia.

Sicard and Barbé<sup>2</sup> report 2 additional cases of postdiphtheritic paralysis treated by serum injection. One of these, an adult, with a generalized neuritis, received a total of 540 c.c. of serum in daily doses of 20 c.c. On the eighth day the paralysis of accommodation disappeared and the pulse rate had fallen from 130 to 90, but it was only after the fifteenth day that bulbar symptoms and the paralysis of the arms and legs began to improve.

PROPHYLACTIC VALUE OF DIPHTHERIA ANTITOXIN. Peters<sup>3</sup> throws some doubt upon the prophylactic value of diphtheria antitoxin. While admitting that some of the reports of the prophylactic use of the serum in institutions are very encouraging, in the majority the inferences drawn are not as convincing as one could wish. They are all unsatisfactory in one particular, that they represent the results obtained by immunizing those who were only “exposed to infection.” It is impossible to say how many or how few actually were exposed or became infected with the specific bacillus.

Peters then briefly details two epidemics of diphtheria. In one there were 21 among 136 exposed who had diphtheria bacilli in the throat. They were all isolated and immunized with 500 units each, but 7 of them, in spite of the immunization, developed diphtheria at intervals varying

<sup>1</sup> Gazette des Hôpitaux, 1908, lxxxi, 75.

<sup>2</sup> Bull. et mém. Soc. méd. des hôp. de Paris, 1907, xxiv, 1445.

<sup>3</sup> British Medical Journal, 1907, xi, 865.

from two to eighteen days. In the second epidemic 20 of 200 children showed diphtheria bacilli. These children were isolated, the school which the children attended closed, and the epidemic promptly stopped without the use of the serum, except in a few of the cases.

Peters contends that bacteriological examination of the throats and isolation of the carriers is sufficient, and personally I agree with his contention, so far as the open and interrupted contact of public schools is concerned; but when the children are together in institutes or hospitals, the children exposed should be immunized. I feel sure that no one who has had a large and prolonged experience with diphtheria in the crowded homes of the poor, where isolation is impossible, can question the immunizing value of the serum.

Hasenkopf and Rothe<sup>1</sup> publish, with the elaborate detail so dear to the heart of the German, a report upon a small outbreak of diphtheria in a school. The throats of 180 were examined, but diphtheria bacilli were found only in the three who had diphtheria. They point out the contrast which their observation presents to so many others, in which the diphtheria bacilli were found in the throats of those who were not and had not been ill with this disease. The bacilli were present in those who had been ill for four, eight, and nine weeks after the onset, and the cases serve as further illustration of the importance of prolonged isolation of the convalescent diphtheria patient.

**DURATION OF ANTITOXIN IMMUNITY.** There have been numerous efforts made to determine the duration of the passive immunity conferred by the administration of diphtheria antitoxin. Clinicians estimate the time as from three to five weeks. Experimentally, antitoxin has been demonstrated in the blood as late as one hundred and twenty-six days after the administration of 25,000 units. Goodman<sup>2</sup> has been doing some laboratory work, from which he concludes that the immunity lasts longer than the period during which antitoxin can be demonstrated in the blood.

The duration of the passive immunity conferred is no doubt varied, and it is not long, nor, for that matter, is an active immunity constant in its duration or prolonged.

**ANAPHYLAXIS.** Instances of death or collapse following the injection of diphtheria antitoxin are recorded at intervals, but when one considers the extremely large number of patients who have been treated in this way, or have been immunized, the number of accidents is so small, a fraction of 1 per cent., that the danger is negligible. Everyone of us has used the serum from hundreds to thousands of times, yet few of us know of anyone who ever had an accident. This year, however, the *Journal of the American Medical Association*<sup>3</sup> records two deaths

<sup>1</sup> Jahrbuch f. Kinderheilkunde, 1907, lxvi, 365.

<sup>2</sup> Journal of Infectious Diseases, 1908, v, 184.

<sup>3</sup> Journal of the American Medical Association, 1908, 1, 136 and 453.



immediately following injections of diphtheria antitoxin. In both instances a choking sensation, burning, congestion of face, and discharge of froth from the mouth came on within a few moments after the injections were made, and in each case the heart continued to beat for considerable time after respiration stopped. On page 768 of the same volume is a note upon a case of collapse, with cyanosis and dyspnea coming on about thirty minutes after an injection. There was total loss of consciousness for four hours, but eventual recovery. Later injections of antitoxin were not followed by the symptoms of collapse.

The nature and explanation of such cases is still completely unknown. An extended review of the subject of anaphylaxis, or proteid hypersusceptibility, is given by Landis in *PROGRESSIVE MEDICINE* for December, 1908, p. 256.

**Dysentery**, which a few years ago came in for much discussion, shows a great decrease in the amount of attention which it receives. This is not because it is less important as a disease than formerly, or because many of the questions connected with it have been solved. It is simply another instance of the wave-like periodicity which affects medical literature as it does other manifestations of life. Only a few articles need be selected for notice.

Jürgeus<sup>1</sup> reviews the present status of opinion in regard to the *etiology*. Formerly a large number of factors were regarded as possible causes, but our knowledge had no firm basis until the importance of bacteria as causal factors was demonstrated. The other factors, such as time of year, overcrowding, etc., became then secondary in importance. It was at first thought that the Shiga-Kruse bacillus was the only actual cause of true dysentery, and the other bacilli closely resembling it were to be classified as pseudodysenteric; but later it became certain that there are a considerable number of bacilli which, while closely resembling each other, are yet different, and are capable of causing epidemics of true dysentery. In any attempt to classify the various types of dysentery, one must consider not only the bacterial factor, but also the clinical manifestations.

In a highly technical article upon *dysentery* and *pseudodysentery*, in the *Zeitschrift f. Hygiene*, 1907, lvii, 417, it is pointed out that one must be cautious about accepting the idea of a purely toxic dysentery, for in a case of uremic dysentery Koll found pseudodysenteric bacilli.

Coyne<sup>2</sup> and Auché report briefly upon a *polyvalent antidysenteric serum*. The idea of preparing such a serum occurs naturally in view of the number of bacilli which appear capable of exciting dysentery. The amount of work reported upon is not great, but the idea is worthy of mention.

<sup>1</sup> *Medizinische Klinik*, 1907, iii, 1369.

<sup>2</sup> *Bulletin de l'Académie de Médecine*, 1907, lviii, 205.

Gillitt has been employing a *vaccinotherapy* in the treatment of dysentery in the central jail of Midnapore. During the years 1900 to 1906 inclusive, there were 1930 cases of dysentery in this jail, with an average mortality of 6.3 per cent. for all years, and a range in mortality from a minimum of 3.4 per cent. to a maximum of 14.4 per cent. Of 106 cases treated by the *vaccinotherapy* only one died, and this one died of a *cancrum oris*.

**Influenza.** Upon this disease singularly little has been written during the year, and this, too, in spite of the fact that clinical diagnoses of influenza are being constantly made. It is probably true that only a very small proportion of these cases are truly influenza, and it is likely that this disease will receive progressively less and less attention until its next appearance in the form of a pandemic. Only a few lines need be given to this disease in regard to its complications and the possibility of the influenza bacillus causing meningitis and septicemia.

Halford,<sup>1</sup> in speaking of his experience with a recent and extensive epidemic of influenza, says that *complications* were common and consisted mostly of pneumonia, pleurisy, otitis media, often of both ears, intercostal and brachial neuralgias, synovitis and jaundice, and notes that in some cases there seemed to be a remarkable tendency to reproduce affections to which patients were liable. Thus in two persons who had had rheumatism, the influenza began with pain and swelling of the joints. Children who were recovering from whooping-cough began again to whoop, and many of these latter cases developed a complicating pneumonia.

*Meningitis* has been recognized as a possible complication of influenza for years, but the cases sufficiently studied by modern bacteriological methods are still few in number. At the 1907 meeting of the American Pediatric Society, Adams reported 21 cases, and to this number Sprigg,<sup>2</sup> of Washington, adds 1 more. The case, after a short period of indefinite phenomena, presented the picture of cerebrospinal meningitis of unusual type, and a lumbar puncture made after death showed an organism which proved to be the influenza bacillus. Of the 21 cases collected by Adams, 18 died; 19 of the cases were in children.

It is only within very recent years that it has been realized that the influenza bacillus can cause *septicemia* and *pyemia*. Spät<sup>3</sup> reports a case of this sort and collects 5 others. Later, Saathoff<sup>4</sup> reported an additional one. Usually the ordinary clinical picture presented by influenza is entirely lacking, and the case presents itself under the picture of a sepsis or an acute endocarditis. In some cases it may be

<sup>1</sup> Australasian Medical Gazette, 1907, xxvi, 449.

<sup>2</sup> American Journal of Obstetrics, 1907, lvi, 467.

<sup>3</sup> Berliner klinische Wochenschrift, 1907, xlv, 1207.

<sup>4</sup> Münchener medizinische Wochenschrift, 1907, 2220.



possible to recognize the nature of the infective agent by blood cultures, but in others the true nature of the case is not known until the autopsy.

**Malaria.** **PROPHYLAXIS.** There have been a number of articles upon the efforts made by municipalities and countries to control this disease through the destruction of the mosquito. Most of these reports are extremely encouraging, and all that seems to be necessary for success in most places is a sufficiency of brains, money, and time.

Those who are interested in efforts by municipalities to combat malaria will be interested in an article by Sofer,<sup>1</sup> in which he describes efforts made by Austria to wipe malaria out of its coast provinces and Dalmatia, where malaria is endemic. The method advocated by Grassi was employed. This consists of the medical treatment of all cases suspected of having malaria, and mechanically protecting the people from the bite of the anopheles. It was at first tried in a single town, but the results were such as to lead to a rapid extension of the methods to large areas.

**BLACK-WATER FEVER.** One of the most discussed questions concerning malaria is the relation which it bears to black-water fever. There is still much diversity of opinion among those best fitted to have an opinion. A new idea, and one which seems worthy of more than mere passing consideration, is advanced by Lukis<sup>2</sup> in some preliminary notes upon the etiology of black-water fever. He comments upon the well-known fact that the territorial distribution of black-water fever does not correspond with that of malaria—that there are many regions in which the latter disease is common in a severe form and yet the former is not seen. He also recalls that while quinine has been often regarded as the actively exciting cause of the hemaglobinuria, the use of quinine is universal, while hemolysis resulting from it is decidedly local. He then points out (at least for India) that the distribution of black water fever corresponds very closely with that of kala-azar or cachexial fever.

Black-water fever closely resembles in its symptomatology Texas fever or hemaglobinuria of cattle, a disease which is due to the presence in the blood of a pyrosoma. This is a parasite which morphologically closely resembles the Leishman-Donovan body, but differs from it in the fact that it inhabits the red corpuscles; whereas the Leishman-Donovan body is, as a rule, found only within the leukocytes and endothelial cells.

Lukis' idea is that black-water fever occurs only in patients who are victims of kala-azar. In those rare cases in which no quinine has been given, the hemaglobinuria is due to the unaided action of the hemolysins produced by the Leishman-Donovan body, but usually the attack is

<sup>1</sup> Zentralblatt f. innere Medizin, 1907, xxviii, 1113.

<sup>2</sup> Indian Medical Gazette, 1908, xliii, 41.

precipitated by the administration of sulphate of quinine to a patient who has been wrongly diagnosticated as suffering from malaria.

McCay, in the same number of the same journal, expresses the opinion that while any salt of quinine may be given prophylactically to those patients who are saturated with malaria, the administration of sulphates in whatever form is dangerous, and that, therefore, as quinine must be given in order to destroy the malarial parasite, the best form of administration is the hydrochloride in combination with sodium chloride.

**ATOXYL IN MALARIA.** Georgopulos<sup>1</sup> has been led, by the facts that some patients do not respond to quinine and others cannot take it, to try the effects of atoxyl upon malaria. He used 2.5 c.c. of a 20 per cent. solution every day for three days, then every other day for six days, and then the same amount every third day for three injections. The cases did well, but no better than with quinine. It would be well, however, to have this method in reserve for appropriate cases, and particularly for those of infection with the estivo-autumnal parasite.

**Measles. BACTERIOLOGICAL STUDIES.** The small amount of work being done in the way of discovering the causal factor of measles, one of the most important diseases of childhood, has been repeatedly commented on in *PROGRESSIVE MEDICINE*. This year we are glad to mention an article by Pacchioni and Francioni in the *Jahrbuch f. Kinderheilkunde*, 68, upon some bacteriological studies of this disease. These workers found a Pfeiffer bacillus-like organism in the conjunctival, nasal, and bronchial secretions from cases of measles, and sometimes the same bacillus was found in the suppurative complications, such as pleuritis, pericarditis, arthritis, meningitis. Blood cultures were at all times negative. This leads them to the opinion that measles is a local infective process with general intoxication phenomena, and the eruption is probably a critical building of antibodies, as with serum disease. They were able to show phagocytic powers in the blood of measles cases against the bacillus found in the eye, nose, and throat.

**COMPLICATIONS AND SEQUELS.** Landis,<sup>2</sup> in an article based upon 457 cases of measles, states that this disease more than any other of the acute infectious diseases may be considered the disease of complications, for there are very few cases which do not show either some distinct complication or aggravation of some one of the usual manifestations. This applies more properly to the cases seen in institutions or under bad hygienic conditions. Among well-nourished and well-cared-for children, complications are not nearly so common and the death rate is low.

Over half of the children of known age were under five years (56 per cent.), and the series contained an unusual number of adults (21 per cent.). Of 349 histories containing data as to previous attacks of this disease, 11 were positive.

<sup>1</sup> Münchener medizinische Wochenschrift, 1908, lv, 615.

<sup>2</sup> American Medicine, 1908, viii, 224.



*Eye.* Next to the respiratory system these complications were most frequent. Marked injection of the conjunctiva was noted in 178 cases. In 29 there was a purulent discharge from the eyes, and 8 of these cases showed edema of the lids. The only serious sequel noted was ulcer of the cornea.

Shottelius,<sup>1</sup> in a bacteriological study of conjunctivitis occurring in measles, found that the streptococcus was common in the fatal cases and infrequent in the cases ending in recovery. This point is of interest because the streptococcus has been found frequently in complications of fatal cases, such as pseudomembranous laryngitis, bronchopneumonia, and empyema. The finding of this organism in fatal cases suggests that it may play much the same role as a secondary invader in measles as it does in scarlet fever (and variola).

*Ears.* Otitis media is not unusual, but its frequency varies in different epidemics. In some it runs as high as 50 per cent. In this series it was noted only in 5 cases.

*Respiratory Tract.* These complications are extremely common, being noted in no less than 385 cases (84.2 per cent.). Coryza is properly a symptom and was practically universal. In a small percentage (3.28 per cent.) it was of a purulent character. The lips were swollen and fissured in 13.

Acute congestion of the mucous membrane of the mouth and pharynx is also a characteristic symptom, but in 39 cases the changes were so intense as to constitute a complication.

Laryngitis was almost constant; usually mild but severe grades of inflammation are not uncommon. The severer forms are characterized by croupy cough, dyspnea, and huskiness of the voice; 15 cases presented symptoms of a severe laryngitis; 2 of these were pseudomembranous; both required intubation, and both died. The seriousness of this complication is well illustrated by an epidemic reported by Granlon. Among 1633 cases, membranous laryngitis occurred 235 times, and of these 218 died.

The trachea may be involved without accompanying bronchitis. Seventy-six cases had a marked cough without any associated pulmonary signs. The cough in these cases may have been due to a laryngitis, or to an involvement of the trachea or larger bronchi.

Bronchitis, while commonly classed as a symptom, possesses such power for mischief that its presence must always be viewed with apprehension. Rales scattered throughout both lungs were noted in 169 cases (37 per cent.).

Bronchopneumonia was seen in 54 cases (11.8 per cent.), and was fatal in 43 (79 per cent.).

Little information was gained in this study as to the relation existing

<sup>1</sup> Münchener medizinische Wochenschrift, 1908, 378

between tuberculosis and measles. That there is some relation is a well-recognized fact.

*Heart.* These complications are rare. In but 12 cases was anything abnormal about the heart noted, and in 4 of these there was a preëxisting lesion.

*Kidney.* Measles is rarely complicated by serious kidney changes. Urinary examinations were made in 178 cases, and 108 of these showed no changes. In 41 there was a trace of albumin, 23 had albumin and casts, and 6 showed casts only. There was no case of marked acute nephritis.

*Gastro-intestinal Tract.* Stomatitis was more than usually severe in 14 cases. Iliocolitis was one of the major complications, and was especially prone to occur in weak and poorly nourished children, and was also more common in the summer months. It was noted 22 times, and 10 of the cases died. In 8 of the fatal cases there was also a bronchopneumonia.

*Noma.* This is one of the worst of the complications, and occurred in 6 cases (1.3 per cent.) of this series. In 5 the mouth alone was involved; in the other the groin also. One of the cases was bilateral. Death occurred in 5 cases.

*Adenitis.* Enlargement of the superficial lymph glands is common. The cervical glands alone were involved in 14 cases, and the cervical, axillary, epitrochlear, and inguinal in 26.

*Skin* complications are not uncommon. Herpes labialis was noted in 5 cases; furunculosis once.

Measles associated with other infections was not noted in this series.

*Mortality.* Of the 457 cases, 57 died (12 per cent.). The fatal cases, with one exception, were less than five years of age. Considering only the children under five, the mortality was 21.5 per cent. Bronchopneumonia was the commonest cause of death—43 cases.

*Excessively high temperatures* are sometimes seen in the course of any of the acute infections, but there are certain of them in which this so rarely happens that each case is worthy of note. Measles, except when there is some cerebral or pulmonary complications, rarely causes hyperpyrexia. For this reason a case briefly reported by Oddo and Sauvan<sup>1</sup> is of interest. The patient, a child aged two years, had a temperature of 110.5° without any clinical evidence of any complication. The patient recovered promptly and without permanent effects.

In the same journal Salon Veras reports a case of *whooping-cough* with a temperature of 111.9.

**Plague.** The importance of this disease, which has always been regarded as only a most remote danger, has gradually increased until we may with justice speak of its present outbreak as a pandemic. For this

<sup>1</sup> Archiv. de Médecine des Enfants, 1908, xi, 259.



reason all of us must become better posted, for it is possible that a case may appear anywhere at any time.

Gill<sup>1</sup> discusses the present pandemic of plague and covers the results of study of this subject during the past year in India. He subdivides the subject into three heads: (1) The course of the present pandemic; (2) the modes of spread of the disease; and (3) the methods by which the disease may be combated.

Two well-marked centres of endemic plague are now recognized to exist, and the forms of the disease to which they respectively give rise are not in all respects alike. One is the Western Asian strain and the other the Indo-Chinese strain.

Plague has long been known to exist in Western Asia, but because of its mildness and its inability to spread, Europeans have come to regard the plague as essentially an Eastern disease. The disease with which we are now concerned is the virulent and diffusible Indo-Chinese form.

This strain was first recognized in Western China in 1860, since which time it has spread slowly along uncertain paths to the coast reaching there in 1867, and reaching Canton in 1894. Bombay became infected in 1896. In 1901 the epidemic reached the northern provinces of India; since then it has spread until now it may be characterized as a pandemic.

The mode of spread of the plague is well illustrated by the occurrences in the Punjab. Plague exhibits a seasonal periodicity, so that during certain seasons it shows no tendency to spread, and in such a period its introduction is not serious; but at other times the opposite is true. Thus, in the Punjab it is only from February to June that the plague assumes epidemic proportions.

During the first two months of an epidemic cases of the pneumonic type occur, and in such cases the plague may spread from man to man; and the disease spreads with alarming certainty to those who attend the sick or dying.

The usual course of events varies. At the onset of the plague season rat mortality is the first sign of the approaching epidemic. Starting from the house forming the original focus of infection, the area in which dead rats are discovered gradually increases, and then in the vicinity of the house in which dead rats were first found a plague case occurs. From this time on the cases multiply, at first slowly and then more rapidly.

Instances are recorded in which the spread from one neighborhood to another is through clothes or merchandise.

A fourth method of spread is said to be found in the migration of rats, but Gill's experience leads him to the opinion that this does not take place except through the accidental transportation of rats in ships or merchandise.

<sup>1</sup> *Lancet*, 1908, i, 213.

The transference of the plague from rat to man is by means of the rat flea.

Preventive measures are to be directed toward the transference of the disease by man, quarantine measures; and by rats, destruction of rats and the prevention of their accidental transportation.

RAT PLAGUE. Reports upon the investigation of plague continue to appear in the *Journal of Hygiene*, and contain a very large amount of interesting information, and anyone particularly interested in this disease can do no better than consult the original articles covering some hundreds of pages.

The first article in the report for 1907 is upon the diagnosis of natural rat plague, in which special stress is laid upon the diagnostic significance of the bubo in the rat. Such a bubo is an aid not only to the macroscopic diagnosis, but in at least 50 per cent. of them characteristic involution forms of the plague bacillus are found. The value of the method of cutaneous inoculation of guinea-pigs was studied and appears to fail in but 2 per cent. of fresh, and 10 per cent. of putrid, rats.

There is an interesting article upon the fate of the plague bacillus in the rat flea. From the size of the rat flea's stomach it is estimated that it might receive as many as 5000 bacilli, and dissection of the flea has shown the bacilli up to the twelfth day, and in one instance up to the twentieth day. From this observation it is inferred that the bacilli may multiply in the flea's stomach.

In non-epidemic periods no bacilli were found in the flea's stomach after the seventh day from feeding on rats.

The rectal contents and feces of fleas taken from septicemic plague rats often contain abundant virulent plague bacilli.

Experiments made during the epidemic plague season, to test the duration of infectivity of rat fleas fed on septicemic rats' blood, showed that the fleas were infective for a period of ten to fifteen days, according to the conditions under which they were kept.

During the non-epidemic season the infective period of the flea was shorter—only seven days.

There is experimental evidence to show that either the male or female rat flea may transmit plague. A single flea may transmit the disease.

Similar experiments with cat fleas were not successful in transmitting plague; with the human flea a small percentage of the experiments were successful.

In six contact experiments, with absolute exclusion of fleas, no healthy animal became sick, although kept for fourteen to twenty-one days in constant association with diseased animals, soiled with their urine and feces, and eating the same food.

When fleas are present the epizootic, if it does start, varies in severity and rate of progress according to the season of the year and the number of fleas present. In an infected cage the infection is effective in pro-



portion, as the test animals are accessible to fleas. Infection can take place without any contact with contaminated soil. Aërial infection is excluded.

Rats may suffer from chronic plague, but the percentage of such rats varies greatly from practically none in Bombay to as high as 28 per cent. in Dhand.

The rat flea has been proved to readily bite man, and when numerous will do so even in the presence of his natural host. Experimenters have been able to keep this species of flea alive for three weeks by feeding it on man alone.

**Pneumonia.** The literature upon this most important of the acute infections shows nothing which can be considered as new. The etiology and pathology of the disease has been worked out pretty thoroughly, but the treatment still leaves much to be desired. There has been an encouraging disappearance of articles upon specific treatments, and a growing appreciation of the value of the hygienic or fresh-air treatment. Several articles upon this subject have appeared, only two of which need be reviewed.

**EPIDEMIC PNEUMONIA.** Fabyan<sup>1</sup> carefully studies a family epidemic of pneumonia in which six out of a family of ten developed pneumonia within a period of ten days, but found no special etiological factor except crowding and poor ventilation. The importance of these factors is probably not great, for they are found in a very large proportion of the cases of pneumonia among the very poor, and yet such epidemics as Fabyan reports are very exceptional.

It is upon such experiences as this that the theory of the contagiousness of pneumonia is largely based, but such instances are so infrequent that they weaken rather than strengthen the theory.

**RÖNTGEN RAYS IN THE DIAGNOSIS OF PNEUMONIA.** In the v. Jaksch clinic they have been making daily observations upon cases of croupous pneumonia with the Röntgen rays, and comparing the picture with the physical signs. They find that this method of examination throws no light upon the nature of the phenomena, not even distinguishing between the lobar and lobular forms. The pneumonia shadow is not thick and homogeneous like that of a pleuritic effusion or a tumor, but is veil-like and mottled and its borders not sharply marked. Pneumonic infiltration is distinguished from pulmonary tuberculosis by the fact that the shadows are transient.

Signs of beginning resolution may show in the *x*-ray picture before there are any physical evidences of it, or any change in the temperature curve to suggest it. The course of the pneumonia is easily followed in this way, and the pictures are of assistance in forming a prognosis. Usually the shadow of the infiltration disappears gradually over the entire area,

<sup>1</sup> Johns Hopkins Hospital Bulletin, 1907, xviii, 439.

just as it appears during the course of infiltration. This method is of special help in recognizing central pneumonia.

It is singular that no one has hitherto made such a study as this, even though one might have anticipated that the results of the work would be no more satisfactory than they are. It is obvious that the *x*-ray can be of little use in the diagnosis of pneumonia.

PHAGOCYTES IN PNEUMONIA. Graham,<sup>1</sup> in a study of the phagocytability of the pneumococci, draws the conclusion that pneumococci isolated from the blood stream are insusceptible to the action of normal opsonin, while the great majority of those obtained from pneumonic sputum are readily phagocytable under the influence of normal serum; organisms obtained from the sputum of 26 cases of lobar pneumonia, showed that 93.7 per cent. were taken up by the phagocytes, hence non-virulent.

CEREBRAL PNEUMONIA. Wise,<sup>2</sup> under the title "Cerebral Pneumonia," discusses cases of pneumonia in which symptoms suggestive of a *meningitis* are present as part, or indeed as all, of the clinical picture. This term is not a good one, but has been used by others. If one really needs a name for this not uncommon type of case, why not follow the precedent established with typhoid. Such cases have been for many years called meningotyphoid, and these cases might well be called meningopneumonia.

The separation of these cases of meningeal irritation from those of actual meningitis, may be a difficult problem; probably there is no sharp line of division between them. It is certain that a diagnosis of meningitis should not be made so long as only diffuse meningeal symptoms are present. The lumbar puncture is here of the greatest help.

All must agree with Wise in his condemnation of the use of strychnine in these cases, and with his appreciation of the value of opiates.

HYPERPYREXIA IN PNEUMONIA. Instances of hyperpyrexia in pneumonia are sufficiently exceptional to deserve note, so that we mention a case reported by Tuckey<sup>3</sup> of a child who, shortly before death, had a temperature of 108.8°. The influence of maximum temperature upon the prognosis in pneumonia has been repeatedly pointed out. The mortality of all cases with a temperature over 106° is 68 per cent., and the higher it is above this point the greater the likelihood of a fatal ending.

TREATMENT OF PNEUMONIA. The use of guaiacol in the treatment of pneumonia is still occasionally mentioned in the literature, but most of the articles are like one by Cain,<sup>4</sup> in which "about fifty" cases are reported without a death. The guaiacol, in doses of 5 to 30 minims, is rubbed into the skin of the chest. This is repeated at twelve-hour intervals, the average number of treatments being between three and four.

<sup>1</sup> Journal of Infectious Diseases, 1908, v, 273.

<sup>2</sup> Pediatrics, 1907, xix, 625.

<sup>3</sup> British Medical Journal, 1908, i, 1231.

<sup>4</sup> Therapeutic Gazette, 1908, xxiv, 4.



A report of fifty consecutive cases of pneumonia without a death is interesting, and would be important were data given which might form a basis of opinion, both as to the character of the cases and the thoroughness with which they were observed. It is well known that with care in the selection of cases one can make the mortality what one wishes.

Mancini<sup>1</sup> has been studying the effects of *digitalis* given during pneumonia, from a biological standpoint. It will be recalled that the use of massive doses of digitalis in pneumonia was advocated some years ago by Petrescu, and his results were such as to lead some to follow his example. His methods never became popular and his results will not stand critical analysis. Mancini, however, has been trying to discover whether or not large doses of digitalis influence the finer biological reaction which has been worked out since the report by Petrescu.

Mancini studied 7 cases, giving each of them 8 c.c. of digitalin, and he investigated the antibacterial power of the blood, the agglutination, the opsonic index, the deflection of the complement, and the immunizing strength of the serum. The work was laborious and led to the conclusion that the biological reactions in pneumonia are not distinctly influenced by digitalis, a result which might have been anticipated because of the failure of digitalis to establish itself as an effective remedy in pneumonia.

Gilman Thompson<sup>2</sup> expresses himself as an enthusiastic advocate of *outdoor air in the treatment of pneumonia*, and states that 36.7 per cent. of 128 cases of lobar pneumonia treated in the Presbyterian Hospital of New York received no medication except an occasional laxative, and all of these cases ended in recovery. He, with justice, points out that the one who reports 10 cases of pneumonia with 9 recoveries treated by large doses of quinine, nitroglycerin, digitalis, or what not, may well attend to these 47 cases without a death.

It is a curious and interesting fact that the men who have large opportunities in hospital practice for the observation of pneumonia have been very generally impressed by the value of the fresh-air treatment, if one may use such an expression, and but little by the enthusiastic reports upon quinine, guaiacol, digitalis, and the many other so-called specific methods of treatment. While the exact opposite is true of a large proportion of the men whose experience with pneumonia is confined to such cases as come to everyone in the run of practice. Everyone who sees much pneumonia in consultation will agree that the hygienic care given to many cases is worse than shocking, and that all of the talk of recent years upon the importance of air to the pneumonic has entirely passed over a too large proportion of the profession. Such articles as this one of Thompson's, even though every word has been said many times, should

<sup>1</sup> Wiener medizinische Wochenschrift, 1907, lvii, 2313.

<sup>2</sup> American Journal of the Medical Sciences, 1908, cxxxv, 13.

be multiplied until it is no longer possible to find a doctor who permits a patient with pneumonia to lie in a close, overheated, and overcrowded room.

Norris<sup>1</sup> makes a report upon 445 cases of pneumonia treated by the *fresh-air method* in the Philadelphia General Hospital, between February 1, 1905 and December 23, 1907. The statistics of the male and female cases have been kept separately because, on account of lack of room, the female cases are still treated in the general medical wards. The cases reported do not represent the average case of pneumonia, but rather an extreme type of the disease. The patients, in the majority of instances, are far advanced in years; nearly all show degeneration of various viscera, high-grade arteriosclerosis, and chronic nephritis is the rule.

In 1905 Ashton and Landis published a report of 991 cases from this hospital, with a mortality rate of 53 per cent. The present series shows a mortality rate of 47 per cent., but when the female cases are eliminated the male cases, which alone were treated by this method, show a mortality of 43.6 per cent., or 10 per cent. less than before the adoption of the present methods. If the cases dying within twenty-four hours of admission are excluded, the mortality rate is 38 per cent.

Of the 62 women treated in the general medical wards, with the usual hospital ventilation, 40 died—a death rate of 64.5 per cent.

Aside from the constantly open windows and door, there has been no change in the plan of treatment. For the most part, symptomatic medication was employed; bromides and opium for active delirium; strychnine, caffeine, ammonia, digitalis, etc., for the asthenic cases.

*Complications.* Among the 445, acute pericarditis was encountered eight times, *i. e.*, 7.1 per cent. In 43,722 cases collected, it occurred 1.1 per cent. Acute endocarditis was found three times, while in 33,139 collected cases it occurred in 153, *i. e.*, 0.46 per cent. This is lower than the writer would place it, but it makes a great deal of difference whether one figures the frequency from clinical reports or postmortem data.

Empyema occurred in a very small number of the cases (only 2 less than one-half of 1 per cent.), while in 15,852 collected cases it was found in 2.2 per cent.

Pulmonary abscess also was found twice, this being about the percentage frequency in 14,214 cases, namely, 0.5 per cent.

Meningitis was noted three times, with two deaths. In 51,212 collected cases, this complication is reported 234 times—*i. e.*, 0.4 per cent. of all cases; of these 93 per cent. died.

Arthritis occurred three times, and is noted 158 times in 30,113 tabulated cases.

<sup>1</sup> American Journal of the Medical Sciences, 1908, cxxxvi, 645.



Otitis media was seen in 6 cases of the 445, and was reported 122 times in 6508 cases. (In all the tabulations Norris' 445 cases are included.)

Parotitis was seen once, and is recorded twelve times in 3575 cases.

Acute nephritis was recorded sixteen times, fourteen of which ended fatally. The urine was examined for albumin in 397 cases, and found in 311, and of these 136 died (34 per cent.). Albumin was absent in 86 cases, and of these 27 died (31 per cent.). In 382 cases the urine was examined microscopically, and casts were found in 236 cases.

In 20,107 tabulated cases, acute nephritis is given as a complication in 263, and the mortality of these cases was 57 per cent.

The following list shows the diseases in which pneumonia appeared as an intercurrent infection—frequently a terminal one. The gravity of the affections is such as to require no comment on the high mortality which resulted.

	Total.	Died.	Mortality per cent.
Chronic nephritis . . . . .	45	41	93
Delirium tremens . . . . .	24	18	64
Arteriosclerosis . . . . .	36	36	100
Myocarditis . . . . .	22	21	95
Alcoholism . . . . .	62	37	59
Uremia . . . . .	5	5	100
Chronic endocarditis . . . . .	5	5	100
Mitral . . . . .	10	8	80
Aortic . . . . .	4	2	50
Pulmonary tuberculosis . . . . .	16	9	56

Pneumococci were found in the sputum of 139 of 156 cases examined. Blood cultures were made in 16 cases: four times with negative results, twice with staphylococci and eight times with the pneumococci.

Leukocyte counts were made in 189 cases, with the following results:

	Total.	Died.	Mortality per cent.
Below 10,000 . . . . .	27	11	40
Between 10,000 to 20,000 . . . . .	85	25	32
Between 20,000 to 30,000 . . . . .	55	14	25
Between 30,000 to 40,000 . . . . .	17	6	35
Between 40,000 to 50,000 . . . . .	6	3	50
Between 50,000 to 60,000 . . . . .	2	0	0

There is no class of cases which is more trying to the doctor than the pneumonia which does not undergo proper resolution. The uncertainties of diagnosis and prognosis are very great. Many plans have been suggested in the way of treatment of these cases, but a correct estimation of their value is difficult, because of the irregular course which such cases take. That a patient improves under a certain line of treatment does not at all mean that the treatment had anything to do with the improvement. To the numerous things which have been tried

before, Crofton adds another which seems worthy of consideration. Crofton<sup>1</sup> reports a case of *delayed resolution* after pneumonia treated by *fibrolysin*, a double compound of theosinamin and sodium salicylate. The physical evidences of consolidation remained for ten weeks after the crisis when injections of fibrolysin were begun, and repeated every second morning until eighteen were given. By this time the lung was entirely clear.

Very little has appeared during the year upon the *serum treatment of pneumonia*, and this will probably continue to be true until some new form of serum appears on trial, not an antitoxic but a bacteriolitic serum.

Jurgius, in the *Charité Annalen*, reports 3 cases of pneumonia treated with the Romer serum, but finds that the cases were not influenced in any way—an observation fully in accord with most of the reports which have so far appeared in regard to this serum.

**Rheumatism.** The interesting and yet unsettled question of the etiology of this disease has not been discussed anywhere this year, although each year, for some time, there have been a number of articles upon this subject. This is to be regretted, and it is to be hoped that next year will bring us new information upon this subject.

**RHEUMATISM IN CHILDREN.** Dunn,<sup>2</sup> in an interesting article upon the peculiarities of the symptomatology of rheumatism in children, draws attention once more to the surprisingly different pictures which this disease presents in children and in adults. In adults the disease is characterized by severe joint symptoms, with only slight tendency to cardiac complications, while in the child severe symptoms referable to the heart are common and the joint symptoms are of relatively slight clinical importance.

In adults the disease begins almost invariably with fever and polyarthritis, while Dunn, in an analysis of 223 cases in children, found the mode of onset as follows: Fever and arthritis, 88 cases; fever and cardiac symptoms, 82 cases; fever with both arthritic and cardiac symptoms, 25 cases; fever only, 18 cases; fever and sore throat, 6 cases; fever and chorea, 1 case; unknown, 3 cases. Thus it is seen that, while arthritis is the commonest localization in the child, it is present in but 40 per cent. of the cases, and that cardiac symptoms, by which is meant actual symptoms, of cardiac weakness such as precordial pain, dyspnea, and orthopnea, are almost equally common. It is also to be noted that a small number of the cases may at the onset show nothing but fever.

The fever shows the widest range, but in a general way varies with the severity of the case. The range is from 99° to 106° F., but hyperpyrexia is less common in children than in adults. The temperature is higher in cases with cardiac symptoms, and in general higher with pericarditis

<sup>1</sup> British Medical Journal, 1907, xi, 1209.

<sup>2</sup> American Journal of the Medical Sciences, 1908, cxxxvi, 66.



than with endocarditis. The daily variations in temperature are, as a rule, not wide, but notable exceptions occur. The temperature usually rises rapidly, but not with extreme suddenness, and the maximum is not always reached early in the course of the disease. The duration of the fever in the 223 cases was as follows:

	Average.	Extreme.
Cases with arthritic symptoms only . . . . .	4 days.	1 day to 2 weeks.
Cases with endocarditis . . . . .	12 days.	1 day to 12 weeks.
Cases with pericarditis . . . . .	39 days.	2 days to 12 weeks.

In comparison with adults the shorter duration of the fever in articular cases, and the frequent exceedingly long duration of fever in the cardiac cases, form a very characteristic feature.

Constitutional symptoms, while sometimes present, are usually slight or absent. The onset may be accompanied by headache and vague aching pains in the back and limbs. Nervous symptoms are generally absent. The profuse acid sweating, so common in adults, is comparatively uncommon in childhood.

Joint symptoms were absent in the majority of cases, and when present were usually slight; swelling, redness, and heat are relatively uncommon, and pain on motion is much less severe. The average duration of the joint symptoms is less than two days. The number of joints affected shows a wide variation, only one joint in 10 per cent. of Dunn's cases.

The younger the child the more apt the peculiarities mentioned above are to be found, while in older children the disease approaches more and more the adult type as the age increases.

The cardiac manifestations are of major importance on account of their great frequency. Evidences of an organic lesion were present in 91 per cent. of the cases, endocarditis in 91, and pericarditis in 26 per cent. The onset of the endocarditis may be insidious as it is in adults, but usually actual symptoms referable to the heart appear. In 65 per cent. of the cases having a murmur, cardiac symptoms were present; dyspnea, palpitation, and precordial pain in the milder cases, with the addition of edema and cyanosis in the severer one.

**RHEUMATIC MYOCARDITIS.** Coombs,<sup>1</sup> in speaking of rheumatic carditis, lays special stress upon four points in the pathology: (1) It is a carditis, the inflammation involves the myocardium as well as the endocardium, and in many instances the pericardium also. This is a fact too often forgotten. The physical evidences of involvement of the endo- and pericardium are so much more striking than those resulting from the myocarditis that the latter is often overlooked or forgotten, although in reality it is the most important. (2) The rheumatic infection is blood-borne. (3) The gravity of rheumatic carditis in childhood lies

<sup>1</sup> Bristol Medico-Chirurgical Journal, 1907, xxv, 193.

in the damage done the muscle, a point already referred to. (4) The rheumatic carditis shows a marked tendency to recur.

PERICARDITIS IN RHEUMATISM. Jossierand<sup>1</sup> again draws attention to accentuation of the *second pulmonic sound* as an early physical sign of pericarditis in the course of acute articular rheumatism. The significance of this sign has been pointed out by others, but has not yet received the attention which it deserves. The recognition of pericarditis as a complication of rheumatism, or of any other infection process, should be as early as possible, and this sign may appear days before friction or change in the shape or size or the cardiac dulness can be made out. One must, however, remember that in children, who above all others are most liable to this complication, the second pulmonary tone is relatively louder than in adults.

CHOREA AND RHEUMATISM. Ferraris-Wyss<sup>2</sup> discusses the ever interesting question of the relation between chorea and acute rheumatism. He accepts, as the most satisfactory theory of the cause of chorea, that of Heubner, that chorea is a rheumatic equivalent and then reports briefly 51 cases of chorea and draws these conclusions:

1. Forty-one of the cases, *i. e.*, 80.4 per cent., show some relation between chorea and rheumatism or endocarditis.

2. In 19, or 37.2 per cent., of the cases the history shows that either parents or sisters had rheumatism or chorea.

3. Of the 51 cases, 16, or 31.3 per cent., had had unquestionable attacks of rheumatism.

4. Of 35 of the cases, concerning whose definite later information could be obtained, 14, *i. e.*, 40 per cent., had attacks of rheumatism.

5. Twenty-seven of the cases, *i. e.*, 52.7 per cent., showed during their stay in the hospital, unquestionable evidences of endocarditis.

PROPHYLAXIS IN RHEUMATISM. Solis-Cohen,<sup>3</sup> in speaking of the prophylaxis of acute rheumatic fever, points out that there are four aspects of the question: (1) That of the initial attack; (2) of the complications; (3) relapses; (4) recurrences. At present this prophylaxis is largely empirical.

The first and last aspects may be best considered together. Because of certain well-known clinical facts which speak for an existing relationship between the tonsils, pharynx and gums, and rheumatism, the mouth, teeth, and tonsils should be carefully looked to. Adenoids should be removed. A susceptible individual should avoid exposure and educate the vasomotor reaction by appropriate physiological exercise by massage, baths, and other hydrotherapeutic measures.

The diet should be simple and nutritious, and should be chosen to

<sup>1</sup> Lyon Medical, 1907, cix, 797.

<sup>2</sup> Jahrbuch f. Kinderheilkunde, 1908, lxviii, 60.

<sup>3</sup> Journal of the American Medical Association, 1907, xlix, 2049.



yield a minimum of nitrogenous waste. In addition the carbohydrates should be cut down and oils and fats substituted.

I believe that exception can be taken to Solis-Cohen's idea of the diet. This disease is a severe acute infection, associated with a more rapid hemolysis than that accompanying any other of the acute infections except frank sepsis, and we should endeavor to combat this by a generous and varied diet, remembering always that a generous diet for a patient in bed is not the same thing as one for a man up and about. Thought must also be given to possible intestinal fermentation and its avoidance.

**EFFECT OF THE SALICYLATES ON THE KIDNEYS.** Ehrman<sup>1</sup> has been led by some articles, which have appeared within the last few years, to the effect that salicylates as given in acute rheumatism have an injurious effect upon the kidneys, to study the effects of this drug in 5-grain doses both on normal individuals and on those suffering with rheumatism. He finds that the prolonged use does not cause an albuminuria, and that any existing albuminuria at the time, when the use of the salicylates is begun, tends to lessen.

He also points out that acute nephritis as a complication of acute rheumatism is practically unknown, although the salicylates have been used in its treatment for thirty years.

**COLLARGOL IN THE TREATMENT OF ACUTE RHEUMATISM.** Witthauer,<sup>2</sup> who has had gratifying personal experience with the intravenous injection of collargol solutions in the treatment of pyemia, has been led to experiment with this drug in the treatment of obstinate cases of acute articular rheumatism, and reports a number of cases benefited in this way after the prolonged and fruitless use of the salicylates. He gives 0.2 to 0.5 grams of collargol in 100 to 200 c.c. distilled water, slowly, per rectum, once or twice daily, and continues the use of the drug for some time in gradually decreasing doses after the cessation of the pain and temperature.

He believes also that one is warranted in inferring that a case which does not yield to this is either not rheumatism or that there is some complication.

**Scarlet Fever.** There is practically nothing new to record upon this disease. We are apparently as far as ever from the discovery of the etiology of this disease, or of a satisfactory method of treatment. Last year and the year before there were a considerable number of communications, especially in the French journals, upon the use of chloride-free diet in these cases, but this year the subject seems to have been forgotten, for I know of but one unimportant article which has appeared. Apparently most observers are satisfied with the milk diet almost universally employed, and the reports upon the chloride-free diet were not such as to lead anyone to change. One statistical article is quoted.

<sup>1</sup> Münchener medizinische Wochenschrift, 1907, liv, 2595.

<sup>2</sup> Medizinische Klinik, 1907, cxi, 1266.

Barlow<sup>1</sup> reports on a severe epidemic of 832 cases of scarlet fever occurring over a period of eighteen months. Efforts were made to trace the origin of the cases, but the source of the infection could be found in only a few instances. Of the 832 cases, 403 did *not* suffer from any complication, but after the initial fever passed on to convalescence without mishap. The other 429 cases suffered one or more complications; but in 132 of them the only complication was an enlargement of the glands at the angle of the jaws.

Death occurred in 44 of the cases, giving a mortality rate of 5.2 per cent.; but in 18 of these deaths there was a coincident infection with the diphtheria bacillus.

The presence or absence of complications does not entirely depend upon the severity of the scarlet fever, but in an almost equal degree, upon the condition of the patient when attacked, and in a lesser degree upon the age of the patient.

Barlow dwells upon the fact that the *diagnosis of scarlet fever* is not always the simple affair many appear to think it is. Scarlet fever is a disease with three main characteristics: a definite rash, a definite sore throat, and a definite condition of the tongue; but it must be remembered that every sore throat is not scarlet fever, every strawberry tongue is not scarlet fever, and, above all, every erythematous rash is not scarlet, nor indeed is every scarlet fever rash erythematous. These three signs must be considered in relation to and in conjunction with one another. The rash may resemble measles, but its distribution and accompanying symptoms are different. The condition of the tongue and the rash bear a definite relationship to one another; the tongue is furred when the rash is out, and the tongue is strawberry when the rash has faded.

One important point of which Barlow speaks is *the length of the infective period*. His opinion is that in some instances this is only a very few days, but in those cases where there are adenoids or enlarged tonsils, the infections may remain active for months. The importance of this latter group of cases, with which should be included the cases of otitis, is not sufficiently appreciated by the general practitioner. They are a great source of danger to other children, and the customary period of isolation must be with them much prolonged.

SERUM TREATMENT OF SCARLET FEVER. But little has been done along serum lines during the year. An article by Monti is quoted, and one cannot escape being struck by the method by which he gave the serum, *i. e., by mouth*. It would seem questionable whether so highly organized bodies as those upon which we depend in serumtherapy would stand passage through the gastro-intestinal tract without undergoing changes which would destroy their activity. The number of cases reported is too small to mean much.

<sup>1</sup> Practitioner, 1907, lxxix, 837.



Monti<sup>1</sup> reports upon a limited experience with the Marpman serum for scarlet fever, and thinks his experience sufficiently encouraging to continue its use until there is sufficient data to warrant conclusions.

The serum is prepared by the hypodermic injection of blood, urine, and scales from scarlet fever patients. Marpman has convinced himself that the yet unknown causal agent of scarlet fever is present in all of these, in the blood and urine during the active stages of the disease, and in the scales when once desquamation is fully established. When these materials are given to animals there is a febrile reaction varying in intensity from mere fever to death. The toxic material is given in gradually increasing doses over a long period of time, and then the serum of the animal is obtained in the usual way. The serum is given by mouth in doses of 3 to 10 drops, three times daily. Given in this way it causes no serum reactions and does not disturb the digestion.

Monti has given the serum in 11 cases, 2 of which were severe, with recovery in all. Campe has used the Marpman serum in 67 cases, with 5 deaths. Of the 62 cases which recovered, 13 were severe. Each of the 5 fatal cases received the serum later than they should, third to the sixth day, 3 showed complications at the time the serum was first administered, and 1 was already moribund at the time it was given.

Campe employed it 200 times as a prophylactic measure, and but two cases developed.

The following conclusions are drawn by Egis and Langovoy<sup>2</sup> from the experience which they have had in the use of the Moser serum in cases of scarlet fever. The mortality rate fell from 47.4 per cent. to 16.1. The serum has mainly an antitoxic influence and affects the complications very little. The serum should be given during the first three days of the disease. The temperature falls the more rapidly the earlier the serum is given; and more rapidly in pure than in complicated cases. Because there is, as yet, no method of measuring the strength of the serum, 200 c.c. should be given at a time. When there is an added diphtheria infection, the diphtheria antitoxin should be given at the same time.

**Typhoid Fever.** Many articles of interest have appeared during the year, but there is nothing of great importance to record, for most of the work done has been in reviewing series of cases presenting some complication or other.

**DISSEMINATION OF TYPHOID FEVER BY THE HOUSE FLY.** Aldridge<sup>3</sup> very well summarizes the present knowledge and trend of thought upon the importance of the house fly as a carrier of typhoid infection.

1. There is a general agreement that water, milk, and shell-fish epidemics do not account for a large proportion of the cases of enteric fever among the troops in India. (Aldridge's work immediately concerns these bodies of men.)

<sup>1</sup> Allgem. Wien. med. Zeitung, 1908, liii, 13.

<sup>2</sup> Jahrbuch f. Kinderheilkunde, 1907, 514.

<sup>3</sup> Journal Royal Army Medical Corps, 1907, ix, 558.

2. There is a large mass of evidence pointing to the close association of epidemics of enteric fever, with a great prevalence of house flies in dwellings, places where food is stored, and in latrines.

3. The seasonal prevalence of flies agrees very closely with that of enteric fever.

4. Statistics show that in Indian cantonments, with 500 British troops and over, the five having the lowest enteric fever admissions rates have no filth trenches, and in the only remaining ones in which there are no trenches the rates are much below the average.

5. There is persistently increasing prevalence of the disease among mounted troops as compared with dismounted.

The importance of flies in the diffusion of typhoid fever has been repeatedly studied, and the possibility of other insects being of importance mentioned. Abe<sup>1</sup> has been studying the *body and head louse* in this connection, taking them from the bodies of patients with typhoid or allowing them to bite infected individuals and has been able repeatedly to recover the typhoid bacillus from the bodies of the lice. Studies of the common flea were negative, possibly from insufficient material.

BLOOD CULTURES IN TYPHOID FEVER. Silverberg<sup>2</sup> has been making some comparative studies of the relative value of various culture media in the isolation of typhoid bacilli from the blood, and concludes that the media of Castellani, Conradi, and Kayser are of about equal value. He is, like all others who have done work along this line, convinced of the great value of the blood cultures as an aid to the diagnosis of typhoid, and that the method is of special value early in the disease, before other more or less characteristic symptoms have appeared.

In speaking of the *diazo reaction*, he says that it is a simple and fairly certain diagnostic aid in the diagnosis, and that it goes hand and hand with the bacteremia. This is a statement with which most will disagree. Its presence means little; continued failure of the action speaks against typhoid fever.

Epstein<sup>3</sup> publishes a careful report upon 158 blood cultures taken in 131 cases of typhoid fever at different stages of the disease in which particular attention is paid to the comparative advantages of various media. He concludes that the best results were obtained with the use of 2 per cent. glucose bouillon, 2 per cent. glucose agar, and ammonium oxalate solution. On the 2 per cent. glucose agar the typhoid bacillus grows in such a characteristic way that the presence of a certain type of colony on it is quite diagnostic, and the absence of such a colony points very strongly against the presence of the typhoid bacillus. The bile media, contrary to the experience of others, were not found to be as reliable as the media mentioned above.

<sup>1</sup> Münchener medizinische Wochenschrift, 1907, 1924.

<sup>2</sup> Zentralblatt f. innere Medizin, 1908, 917.

<sup>3</sup> American Journal of the American Sciences, 1908, cxxxvi, 190.



The results obtained are in accord with those obtained by others. Cultures taken during the first two weeks of illness were positive in 88.5 per cent. of the cases, while in the same cases the Widal was positive in 28.5 per cent. during the first week and 63.5 per cent. during the second. Cultures in the third week were positive in 60 per cent., in the fourth week in 53, and in the sixth in 33, while the Widal becomes progressively more frequent as the case gets older.

In 23 relapses, 16 cultures gave positive results, *i. e.*, in 70 per cent.

So far one can draw no prognostic inferences from the result of blood cultures.

The following conclusions are drawn by Blum<sup>1</sup> in an article upon the value of laboratory methods in the diagnosis of typhoid fever.

Hemoculture is the procedure of election, the only one which can, at present, be regarded as absolutely conclusive of typhoid infection. At the onset it is, moreover, the one that gives the largest proportion of positive results.

*Sero-reaction* in doubtful cases always calls for careful examination, and is a sign of great value, but is not absolutely decisive. The same remark applies to the discovery of the bacillus in the feces.

The *diazo-reaction* appears to be useful only in so far that its presence may suggest the possibility of typhoid fever. (Its persistent absence is always a point against the diagnosis of typhoid.)

*The leukocyte count*, in presence of a reduction of the total number, affords a valuable sign in favor of typhoid fever. Associated with mononucleosis, it may have a decisive value and is of great assistance in differentiating relapses of typhoid fever from secondary complications.

The failure of these methods, or of one or several, or even all of them, does not enable us to discard for good all possibility of typhoid infection, even when they are practised at various stages.

LEUKOCYTE COUNT IN TYPHOID FEVER. Himmelheber,<sup>2</sup> at the suggestion of von Krehl, has studied and reports upon *the absolute and relative numbers of the white blood corpuscle* throughout the course of twelve typhoids of varying intensity. He believes that change in the relative proportion of the mononuclear and polynuclear leukocytes is of more importance from a diagnostic point of view than the absolute leukopenia.

In all the cases studied the absolute count of the white cells was below 7000. The time at which the count reached the lowest point varies greatly, but Himmelheber agrees with Türks, who says that the lowest count is coincident with the most intense toxic phenomena, irrespective of when, in the course of the typhoid fever, this occurs. This suggestion was borne out in the two fatal cases which showed a count of 1760 and 1900

<sup>1</sup> Med. Press and Circ., 1908, LXXXV, 34.

<sup>2</sup> Medizinische Klinische, 1908, iv, 398.

leukocytes respectively. It does not, however, follow, as Limbeck and Hirschfeld claim, that cases with a low white count are necessarily severe, for in one of the cases, an ambulatory typhoid, the whites numbered only 4200.

The leukopenia extends over into the beginning of convalescence, providing there are no complications, but by the end of the fifth week the hypoleukocytosis is somewhat obscured by the very high lymphocyte count.

During the course of typhoid fever the lymphocytes, neutrophiles, and eosinophiles bear a definite and fixed relation to each other, and this relation is dependent upon the stage of the typhoid, the period of increasing temperature, the continuousness, the remission, and the descending period.

During the first period, even as early as the fourth or fifth day, the neutrophiles decrease rapidly in number. During the period of continuous and remittent fever, the number still further decreases.

At first the lymphocytes also rapidly decrease, so that they were repeatedly found to number under 1000 at the end of the first week. Then they change suddenly, so that at the end of the second week or beginning of the third they rapidly increase in number, and there is a relative or even an absolute lymphocytosis, so that the neutrophile and lymphocyte curves cross. The curves bear this relation to each other until very late, when in mild typhoid fever at the end of the fifth or sixth week the curves again cross and assume their normal relations.

This relation and absolute lymphocytosis is the most striking and certain characteristic of the blood changes in typhoid, and is best marked in cases of moderate severity, but it is present in both mild and severe cases. Thus a fatal typhoid with a white count of 1760 had, nevertheless, more lymphocytes than neutrophiles.

The behavior of the eosinophiles is hardly less characteristic. During the fever they are greatly reduced in number, so much so that only in mild cases are they found at all. Then a few days before the end of the fever, isolated cells appear and rapidly increase in number until they are absolutely more abundant than in normal blood. Nägeli has reported them up to 18 per cent., but Himmelheber did not find so high a figure.

The even course of the leukocyte curves can be altered by complications.

In five cases the onset of a relapse was accompanied by an increase in the number of neutrophiles, although there was no instance of hyperleukocytosis except in one case complicated by cystitis, in which the count reached 14,000.

The lymphocytes, with this initial increase in the neutrophile, decrease in number. The eosinophiles behave as with a primary attack.

The influence of hemorrhage could be studied only once, and in this case there was no hyperleukocytosis, but the lymphocytes decreased sufficiently to make the neutrophiles in the majority.



Febrile complications of typhoid, of which there were five instances, were accompanied by an increase in the neutrophiles and a disappearance of the eosinophiles, while the lymphocytes were not affected. The neutrophiles may be increased to the degree of a leukocytosis, three times over 10,000.

**OPHTHALMODIAGNOSTIC REACTION IN TYPHOID FEVER.** Chantemesse<sup>1</sup> makes a brief report upon the ophthalmodiagnostic reaction in typhoid fever. In 60 cases of clinical typhoid he obtained this reaction, in some instances earlier than the Widal reaction was obtained; 50 patients with other diseases failed to show the reaction.

Hamburger<sup>2</sup> publishes a preliminary report upon a modification of the ocular test of Chantemesse for typhoid. The reaction was positive in 27 cases diagnosticated clinically as typhoid, giving either a positive agglutination test or blood culture. In 15 cases, non-typhoid, there was only a slight and transient reaction, which may be easily differentiated from that obtained in typhoid.

**TYPHOID TOXEMIA.** White<sup>3</sup> reports a fortunately unusual case of typhoid fever. The patient, after an indefinite period of uncertain symptoms, was taken with headache, diarrhea, and chilly sensations. Less than forty-eight hours later he entered the hospital in a semidelirious state, with a few rose spots, high temperature, and relatively slow pulse, tympany, vomiting, epistaxis, enlarged spleen, and died on the seventh day of the illness. Cultures showed a typhoid infection, but the autopsy showed no intestinal ulcerations. Death apparently resulted from severe toxemia before time sufficient for the development of ulceration had elapsed.

**MENINGOTYPHOID.** The appearance of meningeal symptoms in the course of typhoid fever is by no means an uncommon thing, but a true meningitis is rare and especially so when due to the action of the typhoid bacillus. Such a case is reported by Lavenson.<sup>4</sup> The case presented the ordinary picture of typhoid, except that there was severe frontal headache with vomiting and photophobia. Later, Kernig's sign and rigidity of the neck developed. Lumbar puncture yielded a fluid from which typhoid bacilli were cultivated. Blood cultures made the same day remained sterile.

The autopsy presented absolutely negative findings, except for the meninges. There were no intestinal lesions and the spleen was not enlarged, while pus was found over the convexity of the right hemisphere, slightly anterior to the premarginal fissure. Similar areas were found in two other places. There was no exudate at the base.

Roeaz and Carles<sup>5</sup> have an important paper upon the therapeutic

<sup>1</sup> Deut. med. Wochensch., 1907, xxxiii, 1572.

<sup>2</sup> Journal of the American Medical Association, 1906, I, 1344.

<sup>3</sup> Montreal Medical Journal, 1907, xxxvi, 607.

<sup>4</sup> University of Pennsylvania Medical Bulletin, 1908, xxi, 55.

<sup>5</sup> Gazette Hebdom. d. Sc. Med. d. Bordeaux, January 26, 1908.

value of *lumbar puncture in the meningeal form of typhoid fever in children*. Meningeal symptoms are not uncommonly associated with this disease in childhood. In some cases they are slight and transient, consisting only of severe headache and repeated vomiting; but in others one may find in addition cutaneous hyperesthesia, irregularity of pulse and respiration, retraction of the head, inequality of the pupils, strabismus and ptosis, and Kernig's sign. There is in these cases no line of sharp division between the not uncommon meningeal irritation to the rare instances of true meningitis, from which one can obtain by lumbar puncture pus or cloudy fluid. These authors report eight such cases, and advocate the use of repeated lumbar punctures for their relief. This suggestion is worth consideration in the adult typhoid who suffers from very severe and prolonged headache.

ABSENCE OF THE WIDAL REACTION. All of us have occasionally encountered cases of typhoid fever, usually clinically certain and sometimes bacteriologically proven, which at no time showed a Widal reaction. Such cases have been reported by Köhler, Jürgens, Brion, and Kayser, and to this list one must now add an article by Hösslin,<sup>1</sup> in which he reports two cases of bacteriologically proven typhoid: one never showing any Widal reaction and the other only a very slight one.

TYPHOID CHOLECYSTITIS. The importance of diseases of the bile tracts and liver, as complications or results of typhoid fever, is now very generally appreciated. This subject is carefully discussed by Thomas.<sup>2</sup> He places affections of the gall-bladder as second only to the intestinal perforation in frequency and importance. They may develop during the fever, during convalescence, or weeks, months, or years later, or they may be entirely independent of any known attack of typhoid fever.

Thomas has collected 154 cases of cholecystitis in typhoid fever from the literature; of this number perforation of the gall-bladder occurred in 39, 11 were operated upon with a mortality of 5.46 per cent., while all the other group died. The prognosis varies with the interval elapsing between the onset of the perforation and the operation. This is the statement which one would expect and is probably correct, but a study of the table which Thomas appends would strongly suggest that there are other factors than time which are important. Thus of the five cases which recovered after operation, there is no statement as to the time elapsing between onset and operation, and of the other three one was operated after an interval of probably two days; and one of the cases which died twenty-three days after the operation from toxemia was also operated two days after the perforation.

The following is the analysis of the 154 cases of typhoidal cholecystitis collected:

<sup>1</sup> Deutsche Archiv f. klinische Medicine, 1907, xci, 314

<sup>2</sup> New York Medical Journal, 1907, cxxxvi, 688.



Age.	Cases.
Birth to ten years . . . . .	5
Eleven to thirty years . . . . .	23
Over thirty . . . . .	20
Not stated . . . . .	106
Total . . . . .	154

TIME OF OCCURRENCE.	Cases.
Few days to ninth day . . . . .	2
Tenth to thirtieth day . . . . .	32
Second to third month . . . . .	13
Fourth to sixth month . . . . .	1
Seventh to eleventh month . . . . .	2
After one year . . . . .	4
Not stated . . . . .	100
Total . . . . .	154

Gallstones were reported in thirty-one cases. About 90 per cent. of the cases were in the female sex. In 50 per cent. of all cases the typhoid bacillus was isolated, and when the complication developed during the fever this percentage was increased to 95.

Ashhurst,<sup>1</sup> in an article upon perforation of the gall-bladder in typhoid fever, says that in the Episcopal Hospital of Philadelphia, from January 1, 1905, to October 1, 1907, there were 2864 cases of typhoid fever, with a mortality of 8.48 per cent. There are recorded 18 cases complicated by *cholecystitis* (about 0.62 per cent.), and among these cases there were four deaths, not, however, due to the *cholecystitis*.

He also has collected 21 cases in which operations were done on the gall-bladder during the course of typhoid fever. Thirteen of these cases died, a mortality of 61.9 per cent.; but in 4 of the cases, all fatal, the operation was abandoned before the lesion of the gall-bladder was found. Omitting these cases the mortality is 53 per cent.

Of 11 cases in which bacterial reports are made, 9 showed only the typhoid bacillus, once typhoid and colon bacillus, and once paracolon only.

So far as symptoms are concerned there are two distinct groups of cases: In the first a more or less gradual onset of abdominal pain, fairly well localized in the gall-bladder region, with localized tenderness and frequently a palpable mass. In the second group the above symptoms have been present for a varying period, hours to days, and then an acute attack of pain, with fall in temperature and sometimes sweating.

Of the 21 cases 11 were correctly diagnosticated and in 9 a diagnosis of intestinal perforation was made.

RELATION OF TYPHOID FEVER TO GALLSTONES. Bader,<sup>2</sup> in an article upon the part which the typhoid bacillus plays in the causation of gall-

<sup>1</sup> American Journal of the Medical Sciences, 1907, cxxxv, 541.

<sup>2</sup> Medizinische Klinik, 1907, iii, 1417.

stones, reviews considerable of the literature upon this subject, and reports upon the bacteriological findings in the bile of 25 cases of cholelithiasis. In none of these did he find the typhoid bacillus, although he found a number of instances of infection with the colon group. He also found that a history of typhoid was present only nine times in 100 cases of gallstones.

He also points out the interesting fact that while typhoid fever is found in all lands and among all people, gallstones are very uncommon in the tropics.

In Munich, during the past twenty years, typhoid has greatly decreased in frequency without there being any decrease in the number of patients having gallstones.

**JACKSONIAN EPILEPSY AND HEMIPLEGIA COMPLICATING TYPHOID FEVER.** Barie and Lian<sup>1</sup> report an unusual complication of typhoid in the shape of Jacksonian convulsions and hemiplegia. The patient, otherwise an ordinary typhoid, without history of previous illness, had two Jacksonian seizures and a left hemiplegia. The paralysis was almost gone within twenty-four hours, and had entirely disappeared within a week.

Nervous manifestations in typhoid fever are not uncommon, but convulsive phenomena are rare. Murchison, in a series of 2960 cases, found only 6.

Paralysis may develop as the result of a complicating neuritis or myelitis, or as a hemiplegia with or without aphasia. The latter form has been repeatedly reviewed in literature, and the number of recorded cases is now fairly large.

The reporters of this case in discussing the possible etiology exclude a hysteria upon the history of the patient, the rapid disappearance of the symptoms, and the presence of the Babinski sign on the paralyzed side.

Cerebral hemorrhage cannot be the cause. The epileptiform convulsions, were this the cause, would point either to an intraventricular hemorrhage or a cerebromeningeal hemorrhage. Both of these are excluded by the very prompt disappearance of the symptoms. Moreover, the cerebrospinal fluid contained no blood.

Cerebral softening was excluded both by the convulsions and by the rapid recovery.

Uremia was excluded, in spite of the presence of albumin in the urine, because of the absence of edema, myosis, or any of the usual manifestations of uremia.

Barié and Lion hold that the symptoms were due to the impregnation of the cerebrum with typhoid toxins. In connection with these cases it may be well to recall that exactly similar things have been noted in the

<sup>1</sup> Bull. et mém. Soc. méd. des hôp. de Paris, 1907, xxiv, 1080.



course of other acute infections, and that they also seem best accounted for on the basis of an intoxication.

**EPIDIDYMITIS AND ORCHITIS COMPLICATING TYPHOID FEVER.** Beardsley<sup>1</sup> reviews the literature of another complication of typhoid fever, epididymitis and orchitis, which is rare, but not so rare as one might infer from the fact that he finds but 102 recorded cases. Seventy-one of these developed during convalescence, 17 during the active period of the disease, and in 14 the time of onset is not mentioned. In 37 the right side was involved, in 27 the left, while 3 were so unfortunate as to suffer a bilateral involvement. In 43 both testicle and epididymis were involved, in 31 the testicle only, and in 10 the epididymis alone. Suppuration occurred in 22 of the 102.

The onset of symptoms is usually abrupt, with acute pain in the testicle or groin. Often there is associated chilliness or even a severe chill followed by a rise in the temperature. The scrotum becomes red, swollen, and edematous. Pain on urination was frequently complained of, and catheterization was necessary in a few instances.

There is no relation between the severity of the typhoid and the occurrence of this complication.

The prognosis as to life is good, and as the process is rarely bilateral loss of function does not usually result. The trouble lasts from a few days to weeks, and operation becomes necessary if suppuration occurs. The majority of the cases are due to the typhoid bacillus.

**LARYNGEAL LESIONS IN TYPHOID FEVER.** Serious lesions of the larynx are constantly mentioned in the text-book discussion of typhoid fever, but fortunately they are rather infrequent clinically. The subject has recently been reviewed by Rieser,<sup>2</sup> who adds a report of two cases. In 1903 Dupuy reported one case and assembled 34 from the literature. Since that time 23 cases have been reported. To these reports must be added that of Keen, in 1896, who collected 221 cases, thus making 281 cases.

Rieser mentions as etiological factors, friction and irritation by phonation and swallowing, catarrhal inflammation with swollen surface, epithelium, thermic influences, bacteria of various sorts, extension from pharyngeal involvement in double parotitis, and possibly dorsal decubitus.

The autopsy records and clinical finding do not at all agree, for both Luning and Keen agree that lesions of the posterior laryngeal wall, at the insertion of the cords and involving the cricoid cartilage, are present in 60 per cent. of the autopsies. Jackson in 360 routine laryngeal examinations in typhoid found ulcers in 68 cases.

The involvement of the larynx may occur at any time in the course of the disease, but over 70 per cent. of the recorded cases are after the third week.

<sup>1</sup> Journal of the American Medical Association, 1908, 1, 1014.

<sup>2</sup> American Journal of the Medical Sciences, 1908, cxxxv, 232.

Clinically the onset is insidious and usually unobserved, the symptoms being obscured by the apathy of the delirious patient. Extreme dyspnea and suffocative spasm may be the first indication of trouble, and the patient may die in the first attack, or after raising sputum and blood the spasm may relax and the patient be temporarily relieved. In the larger number of cases, however, the symptom appears after the ordinary dangers of the disease are past, and at first the symptoms may be treacherously mild, consisting of hoarseness, aphonia, inspiratory stridor, or dyspnea. These symptoms, especially when they are mild, may be incorrectly attributed to weakness and the true nature of the process be misunderstood until a suddenly developing acute edema of the larynx causes a fatal or nearly fatal asphyxia.

The prognosis is clearly indicated by the following table:

Operator.	Died.	Recovered.	Operated on.		Not operated.	
			Died.	Recovered.	Died.	Recovered.
Keen . . . . 197	132	65	55	44	77	21
Dupuy . . . . 26	13	13	7	6	9	4
Reiser . . . . 20	13	7	13	4	1	2
Total . . . . 243	158 65%	85	75 58%	54	87 76%	27

*Treatment.* At the first suggestion of laryngeal inflammation the patient should be placed under constant and competent observation, in readiness for immediate operative relief. Having thus prepared for emergency, steaming of the larynx, ice by mouth and by external pack may be tried. Local spraying with 2 per cent. cocaine or 1 to 1000 adrenalin solutions brings relief. If the symptoms persist in serious degree or increase, a laryngotracheotomy should be made. The intubation tube has been used with success, but of the 5 cases reported within the last two years in which intubation was done it was eventually necessary to tracheotomize.

**TYPHOID SPINE.** Silver<sup>1</sup> makes a painstaking analysis of 67 cases of typhoid spine from the literature, thus reducing the number of cases to 53.

The average age of the 45 cases in which this is mentioned is twenty-seven years, with extremes of fifteen and forty-eight; 45 of 51 cases in which the sex is given were males.

The influence of trauma in the causation of the spinal symptoms is open to question, but the greater exposure of the male sex to trauma may account for its great preponderance. Few cases gave a history of trauma

<sup>1</sup> American Journal of Orthopedic Surgery, 1907-08, v, 194.



before the onset of symptoms, 5 more after the development of slight symptoms, and in 5 additional cases probability of injury was great.

The time of onset varies; 34 cases began during the fever (four times) or during convalescence, 14 within one month after convalescence, and the others one, two, or three months later. Thus 90 per cent. of the cases began before the end of the first month following convalescence.

Some rise of temperature was noted in 28 cases (53 per cent.). In 5 it was not over 100° F., in 10 between 100° and 103° F., and in 13 above 103° F. The temperature may be present from the onset, or it may appear later. It was irregular in its course in 13 cases, and in 8 chills or chilliness occurred. The duration was from two days to three months.

*Pain in the back* is the constant symptom. It is always increased by movement, and may be present only at such times. It is very severe, so bad that in most cases morphine was used. Premonitory symptoms, such as weakness, soreness, or slight pain, may precede the severe pain, but in others the onset is sudden. The pain may be unilateral or bilateral, or worse on one side than on the other. It is described as "dull and heavy," "aching," "throbbing," "cutting," and "tearing." It may be paroxysmal, and may be worse at night.

The commonest location is in the lumbar region (31 times), but the dorsolumbar and lumbosacral regions are listed 5 and 7 times respectively. No instance of cervical pain is recorded. Thus the lumbar region was the site of the pain in 83 per cent. of the cases.

Referred pain was present in 29 cases; to the abdomen alone, 11; to hips and thighs alone, 6; to legs alone, 3; to abdomen and legs, 7; a girdle sensation, 6; to testicles, 3.

Local changes consist of swelling on one or both sides of the spine (14 cases), with redness in 3 and with local temperature in 4. Tenderness is noted in 29 cases and spinal rigidity in 20.

*Kyphosis.* Some projection of the spine is recorded in 15 cases, in 8 of which there was definite kyphosis; out of these 8 the deformity is said to have persisted in 6, while no statement is made regarding the other 2.

Scoliosis occurred in 7 cases, and of these 4 were single and 3 double.

Sensory changes were present in 12 cases, anesthesia in 1, hyperesthesia in 2, paresthesia in 7, and hyperesthesia and paresthesia in 2. Spasticity was noted twice and ataxia once. The knee-jerks were increased in 19 and lessened in 1. Ankle clonus was associated with increased knee-jerk in 6; Babinski was not found in any case; Kernig's sign was present in 2; incontinence of urine was observed twice.

Of the 53 cases, 7 were still progressing when last seen; in 7 the result is not stated, and 39 were said to be cured. Of the cured cases, 25 were complete, 9 showed some stiffness, in 5 what may be described as a drag still remained, *i. e.*, discomfort on coughing, some soreness, and lameness. The duration until cure was given in 39 cases, and varied from one month to two and one-half years, the average being about eight months.

Treatment consisted of recumbency, immobilization, counterirritation, and sedatives.

TYPHOID FEVER IN THE AGED has been the subject of many articles, but literature upon typhoid in the aged is relatively small. Hamilton,<sup>1</sup> in an article upon this subject, reviews the literature and points out, as Manges did in 1898, that this disease is probably more common in the latter half of life than has been supposed. The collected statistics of Chicago, Boston, and St. Louis upon this point from 1897 to 1901 inclusive, show 369 deaths among 3885 deaths in people over 50 as due to typhoid.

Hamilton observed an epidemic of typhoid covering 188 cases, of which 27, or 14.3 per cent., were fifty or more years old. Some effort was made to determine the influence of age upon susceptibility, as is shown by the following table:

Ages.	Patients.	Those who developed typhoid.
20 to 29 . . . . .	55	15 or 27.27 per cent.
30 to 39 . . . . .	89	24 or 27.96 "
40 to 49 . . . . .	78	17 or 21.79 "
50 to 59 . . . . .	44	5 or 11.36 "
60 to 69 . . . . .	41	2 or 4.87 "
70 to 79 . . . . .	8	2 or 25.00 "
80 to 89 . . . . .	3	0 or 0.00 "

As Hamilton states, the figures are too small to warrant definite conclusions, but so far as they go show no material decrease in the percentage of cases between thirty and forty below those between twenty and thirty, and that between forty and sixty the liability to infection is far greater than former statistics would lead one to expect.

The diagnosis is by no means easy, and there is an extraordinary variation in the symptoms described. The temperature is more often misleading than otherwise. Enlargement of the spleen, rose spots, and nose bleed are often absent. The presence of diarrhea, with a peculiar offensive odor may when associated with other symptoms be of value. The diazo-reaction proved of no value. The only sign which was altogether satisfactory was the Widal reaction. Without it many cases of typhoid fever in old people must pass under other names. The mortality is high. Of the 27 cases observed, 6 died.

ANTITYPHOID INOCULATIONS. Two tables are given by Burst<sup>2</sup> in an article upon antityphoid inoculations which are of interest. In an army with an average strength of 161,915, 4,884 were inoculated. Of this number 13, or 2.66 per 1000, were admitted to the hospitals, with a death rate of 7.69. Of the men who were not inoculated, 1019, or 6.48 per 100, were admitted and the death rate was 12.56.

<sup>1</sup> American Journal of the Medical Sciences, 1907, cxxxiv, 551.

<sup>2</sup> Journal of the Royal Army Medical Corps, 1907, ix, 613.



In India, between January 1 and June 30, 1907, 2207 were inoculated and 15, or 6.80 per 1000, later had typhoid; among 8113 who were not inoculated there were 173 cases, or 21.32 per 1000. The mortality rate among the uninoculated was approximately five times that of the others.

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# THE DISEASES OF CHILDREN.

By FLOYD M. CRANDALL, M.D.

**Mortality Rate in Infants.** The importance of continued study of the diseases of children and of persistent efforts toward the reduction of infant mortality is too apparent to require comment. Few other branches of medical work can show so large a reduction in the mortality rate. That efforts should not be relaxed is shown by some striking statistics presented by E. E. Graham in the chairman's address before the Section on Diseases of Children at the last meeting of the American Medical Association,<sup>1</sup> in which it is shown that, while the saving of life during the first two years has been very great, deaths during the first three months of life have not materially diminished. The statistics presented are not local, but are selected from various portions of Europe and America. In fact in some countries, notably in England, deaths under three months have increased in frequency. In London, during the years 1839 to 1844, the mortality rate at this age was 68 per thousand. In the same city between 1898 and 1903 it was 72. According to Newman the infant deaths throughout England and Wales during the first three months of life have slightly increased during recent years, and have slightly decreased during the last six months. He believes this is due to the fact that a greater number of infants begin life with a lower vitality than they did in former years. The foreign-born population of the United States has a larger percentage of children than has the native population, but the far higher infant mortality among the foreign element more than reduces its growth to the level of native-born Americans.

Graham considers various reasons for this mortality of the first weeks of life. Among them are infanticide by neglect or actual intention, incorrect methods of feeding, the use of opiates and narcotics, the direct use of alcohol, but more particularly the excessive use of alcohol by nursing mothers. Infant life insurance and burial clubs have caused the death by neglect of many, for statistics prove that a much greater number of children insured and in burial clubs die than of other children in the same towns living under similar conditions. Malformations, congenital defects, and inherited syphilis are also factors in increasing the death rate of infants. Epidemic diarrhea and gastro-intestinal diseases, however, are by far the most potent causes in increasing the mortality rate. A strange fact has been repeatedly demonstrated that

<sup>1</sup> Journal of the American Medical Association, September 26, 1908.



during war times and in times of siege the infant mortality markedly declines, although the general mortality largely increases. For example, during the siege of Paris, in 1870, the general mortality was doubled, while the infant mortality rates declined 40 per cent. The same striking condition has been frequently observed in times of great industrial depression. It is apparently explained by the fact that the poor woman, having no work, stays at home and nurses her baby, and the child lives. In prosperity she works all day, gives her baby the bottle, and it dies. This is a striking commentary upon the relative value of maternal and artificial feeding.

The factors contributing to infant mortality are so varied, and the difficulties in controlling these harmful influences are so great at the present day, that one is forced to admit that, while the preventable death rate is still very large among the poor, there must be a large necessary death rate. According to the census of 1900 the infant mortality per 1000 in the United States was as follows in those States where registration was in force:

	Per 1000 births.
District of Columbia . . . . .	274.5
Rhode Island . . . . .	197.9
Massachusetts . . . . .	177.8
New York . . . . .	159.8
Connecticut . . . . .	156.8
Maine . . . . .	144.1
New Hampshire . . . . .	172.0
New Jersey . . . . .	167.4
Vermont. . . . .	122.1
Michigan . . . . .	121.3

The infant mortality in some of the cities is very high, being over 400 per 1000 in Charleston, S. C. A number of them show a mortality of over 300, and over 100 cities exhibit an infant mortality above 175 per 1000. A great saving of life has been accomplished in recent years, and much will surely be accomplished in the future. In 1903 the infant mortality of France was 137. In the previous twenty years it was 167. Ireland has an infant death rate below 200. Norway, in 1902, had an infant rate of 75, and Sweden 107 per 1000. Of all European countries, Russia has the highest infant death rate, 270 per 1000. Germany has the next highest mortality, averaging in recent years a little over 200. Medical science and skill have reached a very high plane in both these countries, and infant mortality has been greatly reduced during the past thirty years.

There has been a great decrease in the number of infants dying under one year of age in the United States during the last twenty years. The infant mortality in the United States in 1880 was 246 per 1000. In 1900 it had fallen to 159 per 1000. During the same period the mortality in the cities of the United States fell from 303 to 184 per 1000. In New

York City, in 1891, the death rate in children under five years was 96.6 per 1000, and in 1900 the mortality under five years of age was only 67 per 1000.

In concluding his address Graham asserts that the reduction of the mortality rate in childhood cannot be attributed to a single cause, but is due to improvement in a great number of conditions of which he mentions the following: abatement of nuisances; milk inspection; milk dispensaries; visiting nurses; free antitoxin; improved sanitation; good food; education of girls and young women in the duties and requirements of motherhood; maternity fund in all industrial establishments where married women are employed; care of poor pregnant women before and after confinement; laws carefully protecting all children who are cared for by private individuals, apart from their parents; elementary principles of hygiene taught in all schools; nursing of all babies as far as possible by their mothers; sending children to the country in summer; pasteurizing milk during the hot months; farming out under proper medical supervision of foundlings and institution infants, and the appointment of nurses to visit these infants regularly.

The continuance of the high mortality rate, notwithstanding the great reductions that have been made, has been the subject during the past year of an unusual amount of literature. A renewal of effort seems to have been made both in Europe and this country. Some of these efforts are along the old lines; others are somewhat new. Deutsch<sup>1</sup> gives extended consideration to the subject and calls special attention to the high mortality in large families, and describes methods which have been adopted in many cities. Szana<sup>2</sup> describes the care of infants in the public institutions of Hungary, and lays stress upon the often noted fact that the mortality is less among nursed babies than among those artificially fed. Special efforts have been made to reduce the infant mortality in Oxford<sup>3</sup> with the result that it fell 40 per cent. The chief measure taken was the improvement of the milk supply. A novel method of securing public recognition of the work was adopted by the health committee. A reception was given to the parents of the children who had participated in the milk cure. The thriving infants who were exhibited were ample demonstration of the efficiency of the measures which had been adopted. Encouraged by her success in her campaign against tuberculosis, Lady Aberdeen<sup>4</sup> has inaugurated a movement for decreasing the infant mortality of Ireland. As a first step a series of public lectures is being given on the hygiene of the home and the care of the infant. Mr. Nathan Strauss, of New York, has offered to provide for the city of Dublin a complete milk sterilizing plant, and it is intended

<sup>1</sup> *Archiv f. Kinderheilkunde*, 1908, xlvii, Nr. 1.

<sup>2</sup> *Ibid.*

<sup>3</sup> *Journal of the American Medical Association*, January 18, 1908.

<sup>4</sup> *Ibid.*, April 1, 1908.



to start an infants' milk depot on the plan of the "Gouttes de Lait," which have become so popular on the Continent.

The prevention of infant mortality in the summer months is the subject of an admirable paper by Getty,<sup>1</sup> of Yonkers. He believes that the problem of reducing infant mortality from the intestinal diseases can be summed up in a few words—clean milk properly proportioned for those infants and young children who cannot be fed on the breast, and intelligent care and feeding. To produce these results he suggests the following as the necessary means: (1) Rigid state or municipal inspection of all milk from the producer to the consumer; (2) milk dispensaries properly to modify clean milk in feeding bottles ready for use, and to pasteurize it if it is to be used in the tenements; (3) a campaign of education to instruct both physicians and parents in the art of infant feeding, and to urge on public officials the necessity and the economical value of clean milk; (4) employment of trained nurses in the summer months to follow up cases of digestive disturbances in infants, and to aid physicians in their work; (5) the continued improvement of tenement houses so that the dwellers may have the benefits of proper sanitation and plenty of fresh air and sunlight.

A camp for the treatment of sick babies is described by W. G. Murphy,<sup>2</sup> of Hartford, Conn. This admirable undertaking consisted in a camp maintained in one of the city parks by a committee of the Hartford County Medical Society. The camp consisted of tents and the work was most successful. It would seem that such camps might do excellent work in inland towns where floating hospitals and sea-side sanatoria are impossible. "Outing Work among the Children of the Poor in Cleveland," with a report of the findings in the medical examination of school children, is the subject of an excellent paper by Philips.<sup>3</sup>

**Standards of Development.** In an interesting study of chronological and anatomical age in early life, Rotch<sup>4</sup> calls attention to the fact that the age of an individual is always computed in years. This rule will probably always hold good from a legal point of view, but there are many conditions in which the development of the child forms a much more accurate guide as to its true capacity. The question of athletics, school games, and labor capacity must be settled from the physiological and anatomical conditions present as well as the age. A standard of development should be sought, therefore, in the interest of athletic and educational reform and also to aid in the protection of child life. Physiological and anatomical conditions should be investigated in determining a reliable standard of development. A standard based on anatomical development is more simple than one based on physiological develop-

<sup>1</sup> Journal of the American Medical Association, March 28, 1908.

<sup>2</sup> Ibid., August 29, 1908.

<sup>3</sup> Cleveland Medical Journal, April, 1908.

<sup>4</sup> Journal of the American Medical Association, October 10, 1908.

ment, and is less liable to be mistaken for anomalous conditions and variations. Rotch asserts that the normal anatomy of the wrists is the best part of the person to be used as a standard index. He offers, therefore, as an anatomical index, the different stages of development of the carpal bones and lower epiphyses of the radius and ulna. This is illustrated by numerous Röntgen pictures. If such an index can be perfected, it will do much to render easy the answer to many difficult questions which are brought before the physician for solution.

**The Physician and the Schools.** Public school education was the subject of an address delivered by Kerley<sup>1</sup> before the last meeting of the American Pediatric Society. In the United States there are 18,000,000 children at attendance in the public schools. The school year has been increased in many places to ten months. Owing to changed conditions of living in all clases, as a result of stress and competition, of social duties and amusements, or to indifference and indolence, parents see comparatively little of their children—much less than they did fifty or even twenty years ago. The chief control of the child has been transferred from the home to the school, so that the duties and responsibilities of the public school have increased tremendously. This means, therefore, that the schools should receive the closest attention of the physician. An immense majority of children complete their schooling before their sixteenth year, and pass out of the school door to take up the world's work. The State takes the child from his game, from the street, from the park, or from the field and puts him into the school and demands that he remain there five hours a day, five days in the week.

What is the child's treatment in the school? In the last annual report of the Superintendent of Schools of New York City, Dr. Maxwell, referring to the manner in which the city cares for both the well and the defective school children, writes as follows: "Sitting several hours a day at a desk which may not be hygienically constructed, increases such diseases as curvature of the spine and often produces faults of posture, which the physical exercises of the class room and gymnasium barely avail to counteract. Defects of eyesight are certainly aggravated by the work of the class room. Although the school is doing what it may with its present resources, to neutralize the evil effects of urban life upon children, yet these resources are inadequate, because they do little or nothing to relieve those who are suffering from a physical defect." In view of these facts it is not strange that the schools are receiving more and more attention from medical men and are being placed under medical supervision more thoroughly each year. More is appearing in literature year by year upon the subject. The feeding of school children has also been the subject of much recent comment in both the professional and lay press.

<sup>1</sup> Archives of Pediatrics, July, 1908.



**Ophthalmia Neonatorum.** It is asserted by W. C. Nance<sup>1</sup> that the prevailing idea that ophthalmia neonatorum and gonorrheal ophthalmia are always one and the same does not hold good in the light of investigation; 70 per cent. of his cases were gonorrheal. The pneumococcus was responsible in 10 per cent., and the staphylococcus, diplobacillus, and bacillus coli were found in the remainder. He asserts positively his belief that silver nitrate is the best remedy and no other medication can take its place. If the disease is recognized early and intelligent treatment is promptly instituted, Nance believes that there need be but little fear of an unfavorable outcome. Greef<sup>2</sup> also commends the use of nitrate of silver, but he believes that the full strength (2 per cent.) used by Credé is not always necessary, as a solution of 1 to 1400 of nitrate of silver is sufficient to kill gonococci. He recommends a solution of one-fourth of 1 per cent. Mayo<sup>3</sup> also holds that nitrate of silver is the sheet anchor in the treatment and prevention of the ophthalmia of infants. He recommends its use in 2 per cent. solution in all cases. In mild or doubtful cases protargol in 10 per cent. solution may be used. A reading of literature seems to indicate that nitrate of silver is regarded by most observers as the most efficient agent in the treatment and prevention of this grave condition. Many use the original Credé method. Others use a modified method in routine cases, but use the full 2 per cent. strength in undoubted cases.

The subject in its legal aspects is considered in an extended article by Park Lewis,<sup>4</sup> who discusses the responsibility of midwives and urges the enactment of laws in each State, placing the supervisory control and license of midwives with the boards of health; requiring that these unqualified practitioners be examined and registered in each county and that they be required to report immediately each case of ophthalmia occurring in their practice. He urges the distribution by health boards of circulars of advice to midwives and mothers, giving instruction as to the dangers, method of infection, and prophylaxis of ophthalmia neonatorum, and also the preparation and distribution of ampoules or tubes containing the chosen prophylactic. For midwives he recommends a 1 per cent. solution of nitrate of silver, and for physicians the Credé solution. If used as directed by Credé, one drop from a one-eighth-inch glass rod, it is free from excessive irritation and is absolutely safe.

**Congenital Laryngeal Stridor.** In reporting a case of this character, A. W. Myers<sup>5</sup> quotes the following paragraph from Thompson and Turner, who give an admirable picture of this condition: "The infant who appears normal in other respects is noticed shortly after birth to have noisy breathing. The noise consists of a croaking sound accom-

<sup>1</sup> Journal of the American Medical Association, June 27, 1908.

<sup>2</sup> Die Therapie der Gegenwart, January, 1908.

<sup>3</sup> Practitioner, March, 1908.

<sup>4</sup> Buffalo Medical Journal, January, 1908

<sup>5</sup> Archives of Pediatrics, August, 1908.

panying inspiration, which rises to a high-pitched crow when a longer or more vigorous breath is taken. Expiration may be accompanied by a short croak when the stridor is loud, but at other times it is noiseless. Even in the most severe cases there are occasional brief intervals, during which there is no sound audible, but with this exception the stridor goes on constantly while the child is awake, and sometimes even when he is asleep. Any emotional excitement, or any physical cause of deeper breathing, such as exposure to colder air or the exertion of sucking, is apt to intensify the sound. The child's power of crying and coughing is unaffected. The breathing, although noisy, is not accompanied by the slightest distress, and there is no cyanosis. There is, however, always marked inspiratory indrawing of the thoracic and abdominal walls except in the mildest cases."

While the clinical features of congenital laryngeal stridor are well defined, there is much disagreement as to the manner of its causation, and the definition which Rabé gives seems to be hardly justifiable. He defines the condition as a manner of respiration characterized by an inspiratory noise, sonorous and continuous, appearing immediately after birth, or several days later, and connected with the existence of congenital malformations of the larynx. These malformations of the larynx he divides into two types following Variot's classification. In the first group are those cases in which the deformity is very marked, with epiglottis folded on itself into a narrow gutter, and the aryteno-epiglottic folds so soft and flabby as to approach or meet in the middle line, leaving only a narrow chink between. There is thus formed a vestibule, which sinks in and vibrates under the influence of the current of inspired air. The second group comprises those in which the deformity is less marked and is limited to the epiglottis, which is rolled on itself in the same manner as in the first group, but to a lesser degree. By reason of this rolling the aryteno-epiglottic folds are brought into contact, but only in their anterior thirds. In this type the stridor results chiefly from the vibration of the epiglottis. No provision is made in this classification for those cases in which the clinical picture is present in its entirety, but in which no laryngeal abnormality can be demonstrated.

The other important theory as to the etiology is that of tracheal compression, more often by an enlarged thymus gland. Interesting features reported by Myers were co-existence of the clinical features of congenital laryngeal stridor, with physical signs strongly suggesting enlargement of the thymus gland; disappearance of these physical signs under x-ray treatment; coincident clearing up of the symptoms of laryngeal stridor. He does not maintain that every case of congenital laryngeal stridor has an enlarged thymus as a causative factor, but that such an enlargement may give rise to this symptom complex, and that cases of this character are within the reach of our therapeutic resources. The subject of thymic asthma received extended attention in these pages last year.<sup>1</sup>

<sup>1</sup> PROGRESSIVE MEDICINE, March, 1907, pp. 192-193.



**Sclerema Neonatorum.** Two interesting cases are reported by Humpstone,<sup>1</sup> of Brooklyn: one of sclerema and one of edema in newborn infants. Congenital sclerema was described by Uzembezius as long ago as 1718. In 1877 Parrot, of Paris, pointed out the fact that while the two conditions are quite similar clinically, they are quite different pathologically. Later articles appeared in English, one in 1890, by Ballantyne. In 1899 by far the most exhaustive article was published by Soltman. With our present knowledge of the pathology of these conditions, it is quite impossible to give an accurate definition. Soltman defines the clinical picture of sclerema as a general vital sinking of body warmth, accompanied by a general hardening of the skin and its adjacent cellular and fatty tissue, with or without serum infiltration beneath the skin. Ballantyne defined *edema neonatorum* as a serous infiltration of the skin and subcutaneous tissues. The etiology of each is probably the same. The trouble develops generally on the third or fourth day of life, rarely, if ever, after the eighth day. It occurs in premature infants with weak cardiac action or poor circulatory stamina from hemorrhage, or pulmonary atelectasis, or nephritis, or exposure to cold after birth, or in some cases without any recognizable causative factors. Soltman considers syphilis a causative factor. Dumas considers the condition similar to phlegmasia dolens, having found thrombosis of the inferior vena cava in a fatal case. Ballantyne thinks the disease more frequent in the winter months. Koplik considers superfetation a cause. Umbilical infection is mentioned by numerous authors.

The postmortem appearance of the internal organs do not differ much, if any, in the two conditions. There have been found atelectasis, pneumonia, general congestion of the abdominal viscera and the brain and its meninges, and thrombosis of the inferior vena cava. In the skin are found the chief differences in the pathology of the two conditions. In sclerema the skin of more or less of the whole body is firm and tense, and cannot be pinched or pitted. Cut portions glisten not unlike the yellow appearance of normal fat, but are of a consistence harder than usual. Ballantyne found on microscopic examination increased connective tissue. Parrot considers the condition a drying of the skin, with consolidation of its layers—so-called “arthripsical induration.” Other observers have not found this, but believe the whole condition to be due to a greater amount of stearin than usual, causing a more bulky condition of the subcuticular fat, due probably to the lowered body temperature. In edema the skin, particularly of the legs and dependent portions, is of a bluish color, has a soft feeling, and pits readily. Sections of the skin and subcutaneous tissues show a congested condition, and yellow watery serum exudes. Microscopic section shows the tissues opened out by the infiltration of serum, with a congestion of the capillaries

<sup>1</sup> New York State Medical Journal, April, 1908.

suggestive of some dilatation of the capillaries from a vasomotor disturbance, or in other words a trophic vasoneurosis.

The clinical picture in both conditions is much the same. The swelling begins in the legs, very rarely on the face or trunk, and spreads over the back and involves the hands and arms. The condition is accompanied by drowsiness or active delirium, with a peculiar shrill cry, feeble circulation, feeble respiratory action, subnormal temperature, collapse, and development of intercurrent complications, as diarrhea, pulmonary disease, or nephritis. While they possess these points in common there are, however, distinctions. Sclerema generally extends over the whole body, the skin is tense, waxy in color, does not pit, and is adherent to adjacent tissues. There is also a stiffness of the joints and subnormal temperature. Edema neonatorum does not leave so hard a feeling, is livid gray in color, often has an odorous moisture on it, pits distinctly, is easily pinched up, and the swelling is greatest in dependent parts. There may be irregular fever. Phlebitis, umbilicitis, erysipelas, phlegmon, pneumonia, gastro-enteritis, and nephritis have been observed as complications. The prognosis of sclerema, if general, is absolutely bad. A few cases not general have recovered. In edema the outlook is better, but always serious.

The treatment of both conditions is the same. The baby should be cottoned and kept warm in a basket. It should not be moved at all. Excretions should be gathered on absorbent cotton. Feeding should be by gavage with expressed mothers' milk, or whey mixtures of modified cows' milk, or by simple 5 or 6 per cent. sugar solution. Rectal enemata of saline solution, one-half ounce with 2 to 5 minims of brandy, every two or three hours, and oxygen for the periods of collapse are indicated.

From observation of these two cases, and from a review of literature, Humpstone believes that edema neonatorum is a vasomotor disturbance of central origin, and that sclerema is a trophic adipose disturbance with a profuse formation of stearin and lack of olein. Both are really symptomatic rather than diseases in themselves.

**Acute Arthritis of Young Children.** Inflammations in and about the joints are not uncommon in young children. The diagnosis is difficult in the early stages, but is highly important, as the result of prompt treatment in most cases is very satisfactory. The subject is fully reviewed in a recent editorial article.<sup>1</sup> Young children are peculiarly subject to joint inflammations when attacked by germ infection. The younger the child the more apt it is to have joint involvement; and, moreover, the number of joints affected is liable to be greater. Any joint may be involved, but there is a proneness for infection of the small joints of the wrist, knee, foot, and clavicle. Thus, pyogenic germs entering at the umbilicus or through the intestinal tract may give rise to arthritis,

<sup>1</sup> Archives of Pediatrics, April, 1908.



as may also the pneumococcus or the gonococcus. The infecting organisms of rheumatism have, of course, a special predilection for the joints, and the tubercle bacillus also finds in the joint ends of the bone a favorable site for growth. The joint regions also are very apt to be involved in certain other infections, which are not so acutely inflammatory, as in congenital syphilis and infantile scurvy. In rachitis also there is greater tendency to affections of the joint ends of the bone than of the other parts. Not only are the joints more susceptible in children, but the tissues about the joints are also more liable to inflammation in infants than in older children.

The cases of joint involvement in children under five years fall into certain groups. Shortly after birth the infections most frequently met with are those due to sepsis; somewhat later, though still during the first few months, those due to the gonococcus. Both these infections are apt to be multiple. Between the first and fifth years the child may suffer from various types of infection of several or single joints. The infective agent may be the streptococcus, the staphylococcus, the pneumococcus, the typhoid bacillus, and occasionally the colon bacillus. Children over five years old are much less apt to have suppurative conditions in the joint regions, and when they do occur the point of invasion can usually be determined. Joint disease in children over five years is usually either rheumatic or tuberculous. Infections of the bone and of the cellular tissues adjacent to the joints frequently give rise to swellings and to other signs very similar to those found in actual involvement of the joints. Osteomyelitis, periostitis, epiphysitis, and deep cellulitis often occur near the joints, and may extend into the joint capsule. On the other hand, inflammations beginning in the joints may quickly extend to the tissues around the joints, and these may become more inflamed than the joints themselves. In case of the hip-joint, conditions which may confuse the diagnosis are: perinephritic abscess, psoas abscess, and ischiorectal abscess. It may be difficult to decide at an early stage, particularly when the region of the hip is affected, whether the infection is primarily of the joint or of the structures adjacent. If the inflammation is very acute, it is usually impossible to tell from the local symptoms what form of infection is present in a joint, since the local signs are very similar whether the infecting agent is the streptococcus or some other organism.

If the inflammation is subacute or of chronic type, it is more apt to be due to the tubercle bacillus, to the gonococcus, or to the agency of rheumatism. The absolute determination of the form of inflammation can only be made from the fluid obtained from the inflammatory focus. A probable diagnosis, however, of the form of infection can usually be made from the history of the case and from the general physical examination. If the patient has had ophthalmia or vaginitis, the probability is that the joint affection is due to the gonococcus. If there

has been a preceding pneumonia, it is of course probable that the arthritis is due to the pneumococcus. In rarer instances the joints are affected in cases of influenza and typhoid. If the condition is less inflammatory and involves only one joint, the probability is that it is tuberculous. Rheumatic arthritis is very infrequent under two years of age, and practically unknown under one year. It is, moreover, apt to involve several joints successively. Treatment in all cases should be begun by putting the affected part at rest and separating the joint surfaces by some form of bandage or traction. In conjunction with rest, applications of wet dressings of aluminum acetate, or of 60 per cent. alcohol should be made. It is surprising in how many cases this form of treatment will result in a subsidence of the inflammation. The cases should be very carefully watched, however, for evidences of suppuration. If this occurs, incision should be made at once. The operation should be very simple, merely an incision into the inflamed tissues and into the inflamed joint, if necessary with evacuation and with provision for thorough drainage. When the bone is diseased the infected focus should be removed. The suppuration usually ceases rapidly and the joints heal, with full recovery of function in young patients. Early but simple operation results not only in saving life, but in securing perfect functional results in the great majority of cases. Where the joint affection is a manifestation of general sepsis, the conditions are not favorable.

A careful history of the patient from birth should always be obtained, the inquiry being directed particularly to umbilical infection, early ophthalmia, vaginitis, pneumonia, typhoid fever, influenza, and furunculosis. The patient should be undressed entirely for examination, since failure to make a diagnosis more frequently occurs because the patient is not carefully examined than because the physician is unfamiliar with the condition. The diagnosis of tuberculosis or rheumatism should be made by exclusion, and it should be remembered that infantile scurvy is frequent under one year of age. The earlier proper treatment is instituted, and if necessary simple incision is done, the fewer the number of joints involved and the greater chance of complete recovery of function.

**Atrophic Infants and Children.** The problem of dealing with the sick children of the poor in large cities is one of the most difficult with which the medical profession has to contend. The usual forms of charity intended for their relief consist in attendance at dispensaries, day nurseries, the visits of district physicians and nurses from dispensaries and settlements, the extending of hospital accommodations to proper cases, and fresh-air excursions and homes in the summer. But there is one disheartening feature which confronts the worker who is seeking to permanently help these children, namely, their defective vitality from the wretched environment that so often surrounds them when returned to their homes. They frequently pass from one institution to another, each one contributing its share of effort, but really not able to do more



than to temporarily relieve the most urgent necessities. These little waifs pass on from hand to hand until their waning vitality is exhausted.

All purely institutional work for these children should be only temporary. After an acute illness has been relieved, they should have other management. If they must be sent back to faulty life conditions at home, after discharged from an institution, the relief afforded by the latter will be of very temporary value. Neither is good accomplished by sending them to other institutions, as the collecting of many little children under one roof is not good for them, no matter how well managed the institution. After a long experience with this class of cases, Chapin<sup>1</sup> has found that relief can be much better accomplished along the lines of family life with individual supervision instead of the collective life with institutional methods. Acting on this idea the Speedwell Society was inaugurated in 1902, and has since been in successful operation. The plan followed is the boarding-out system, and the results have been remarkably good, considering that bottle-feeding has been exclusively employed, as wet-nurses have never been available. The cases have been placed in carefully selected private families in the neighborhood of Morristown, New Jersey, which affords a very healthy location. A doctor and trained nurse have oversight of the cases. The foster mother is instructed in feeding, and other methods of caring for the baby. A supervising nurse secures them from the city and returns them to their homes when discharged.

The work is not confined to the summer months, but is continued throughout the year. There is no time limit for keeping the children, but each one is retained long enough to obtain permanent improvement or to prove that the case is hopeless. It is believed that it is better to permanently help a few than only temporarily to help many. The most satisfactory results have been obtained in the case of infants suffering from chronic malnutrition due to prolonged faulty care and feeding. Chapin's experience in this work shows that, even on the bottle a majority of such children can be saved if a fairly good individual environment can be secured and careful oversight of the feeding maintained. It is a fact too well known that in the average hospital and institutions such babies usually succumb. A hospital or institution of any kind should only be used temporarily in cases of acute illness of infants. The patients should be sent out to recuperate after the acute symptoms have been relieved. If possible they should always be sent to the country. During its six years of existence, the Speedwell Society has cared for 817 children. A valuable result of the work has been the training up in a given neighborhood of a number of foster mothers, who, by constantly taking these infants into their homes, become expert in handling them. In such work no capital is required to be tied up in

<sup>1</sup> Archives of Pediatrics, July, 1908.

a building. The visiting doctor and nurse should be paid a salary, and outside of this all the money goes to the board of the children. If contributions fall off the work is contracted until more comes in, when it again expands. Resources and efforts thus act automatically. The plan has proved to be economically sound as well as practically efficient. Every crowded community having much destitution can best look after its little waifs and strays and save most of them by arranging to board them out in a neighboring countryside under careful oversight.

**Rickets.** Although rickets is never a fatal disease, it is one of the most important in the realm of pediatrics. It is an active factor in many grave nervous conditions, and the cachexia which follows it predisposes the child to every form of acute disease. The rachitic child is especially liable to attacks of bronchitis and pneumonia, and to the gastro-intestinal diseases. Moreover, he has not the vitality with which to combat the acute disorders. Notwithstanding its importance it does not receive the attention either from parents or from physicians which its gravity deserves. Southworth,<sup>1</sup> in an admirable article on the importance of the early recognition and treatment of rickets, calls attention to the apathy of parents in regard to the condition, which is equalled only by the failure of physicians to recognize its early symptoms and to institute prompt treatment. He urges the importance of careful inspection and examination of the body of every young child presented for treatment, an examination which can be made rapidly and with the expenditure of but little time. It is a too common error to assume that because some of the symptoms are lacking the difficulty cannot be rickets, for the disease manifests itself under many guises and its early force may be expended chiefly on a few structures. The epiphysis at the wrist may be unmistakably enlarged, while the bones of the head are apparently normal. On the other hand, the head may show varying degrees of enlargement and squareness due to overgrowth of the frontal and parietal bosses, with no recognizable involvement of the epiphyses. The weakness of the muscles of the back and of the ligaments of the spine resulting in the typical rounded kyphosis of the lower dorsal and lumbar region may be the condition which first attracts attention. Abdominal distention, favored by weakness of both striped and unstriped muscle fibers, may be extreme, moderate, or completely absent. The same variability pertains to the bending of the long bones, irregularity of dentition, and the rest of the commoner manifestations.

The thorax comes nearest to presenting an exception to this rule. Enlargement of the costochondral junctions, commonly known as beading of the ribs or the rachitis rosary, is probably the most constant sign of all, and, even when not recognizable externally by palpation, may be present on the inner surface of the thorax. In fact, the abnormal soft-

<sup>1</sup> Journal of the American Medical Association, January 11, 1908.



ness of the thoracic structure may be first strikingly apparent from the sinking in of the chest walls during inspiration in some acute affection of the respiratory tract. One need only spend a few minutes watching this collapse of the anterolateral areas of the thorax, where expansion should take place, to realize what a serious handicap this is to the infant. It increases the dyspnea and frequency of respiration. It multiplies the labor and fatigue, adding to the possibilities of exhaustion of the muscles of respiration and of the respiratory centre.

No single remedy should be emphasized so strongly as to lead the practitioner to the belief that with its use he may neglect the all-important dietetic and hygienic measures of treatment. Rachitis, indeed, tends to spontaneous recovery on the proper assimilation of a broader general diet, and special attention should always be given to the introduction of such articles as shall compensate for the previously insufficient proteid, but phosphorus at certain junctures Southworth believes to be almost a specific. As seems most rational, it is particularly useful in rachitic instability of the nervous system in tetany, laryngismus stridulus, head-nodding, and the tendency to convulsions. In children with a fairly developed musculature, but who have passed the usual age without walking or who, having begun to walk, have ceased to do so, the effect of phosphorus is relatively brilliant. Such immediate results cannot, of course, be expected when the musculature is not sufficient to support the body, but even here the effect may be seen in greater activity. On delayed dentition it has a less certain, but frequently favorable, influence. Reasonable prompt in its action on the nervous system and in restoring the use of the limbs, its effects on the osseous system are necessarily slower and less readily detected. Bone deformities, although checked, remain, or are but slowly effected. To this latter fact the skepticism concerning the efficiency of phosphorus is due. The use of phosphorus with cod-liver oil opens an avenue for discussion, but the results in equally suitable cases in Southworth's experience have not been so prompt with cod-liver oil alone. It is suitable for administration during the cold months of the year, but during the hot months, or during an inter-current attack of diarrhea, its use is suspended and the phosphates of iron and calcium are substituted.

The etiology of rickets has been the subject of considerable recent study, but opinions still vary greatly. Findlay<sup>1</sup> says that not one of the many theories which have been elaborated to explain the cause of rickets has been universally accepted. Not only from the clinical, but also from the experimental aspect, they all lack unequivocal proof. It is some error in feeding which in England and America is commonly believed to bring about the disease, but it is doubtful if feeding plays an important part in the etiology of rickets. Experimentally it cannot be caused by

<sup>1</sup> British Medical Journal, July 4, 1908.

improper feeding. By confining young dogs and depriving them of exercise, rickets has invariably been induced, although their diet was beyond suspicion, the air which they breathed pure, and their kennels kept scrupulously clean. Control animals, allowed exercise, but otherwise similarly treated, did not become affected. Examination of the conditions under which rachitic children are reared reveals one constant and invariable factor in their lives, namely, confinement. On such experimental and clinical grounds, Findlay concludes that confinement, with consequent lack of exercise, is the main factor in causing rickets. It is possible that there may be a toxin responsible for the immediate results, but without lack of exercise this toxin will not produce any injurious effects.

The theory that rickets is the result of lack of sunlight is not a new one. Owing to the frequency of the disease in northern latitudes, the influence of the seasons, and the curative effect of country air, Ebbell<sup>1</sup> adopts the theory of lack of light as the principal causative agent. While lack of light may no doubt contribute to the development of the disease, there is little evidence that it will alone produce it. Those who have held this theory most strongly have failed to eliminate other potent causative factors. The feeling that the disease is a toxemia of microbic origin is certainly growing, but demonstration is yet lacking. This theory is accepted by English,<sup>2</sup> who quotes extensively from standard authorities. He holds that the arteritis, with thickening of the walls of the arteries; the great proliferation of small vessels; the large production of new cells; the peculiar changes in the bone with overproduction of cartilage and lack of ossification; the atrophy of muscles; the hypertrophy of internal organs, mostly a connective-tissue hypertrophy, with obliteration of true glandular structure; the enlargement of the lymph nodes; the many signs of chronic inflammation; the geographical distribution of the disease; the influence of climate and environment; the time limit of the disorder, although the food and environment may remain as unfavorable as before—all this does not appear to be a picture of starvation, but of a specific disease. The blood in the early stages of rickets does not seem to have been carefully studied as yet. While hereditary influences, parental disease, unsanitary life and environment, improper and insufficient food, may all be predisposing causes in so far as they weaken the infant's powers of resistance, English believes that the disease itself is caused by microbic toxins.

*Rachitic erosion of the permanent teeth associated with lamellar cataract* is the subject of an interesting paper by Abt and Frank,<sup>3</sup> who believe that one is justified in concluding that in those cases of lamellar

<sup>1</sup> Norsk Magazin for Laegevid, March, 1908; Journal of the American Medical Association, April 25, 1908.

<sup>2</sup> Pediatrics, October, 1908.

<sup>3</sup> Journal of American Medical Association, October 3, 1908.



cataract associated with erosion of teeth and other rachitic changes rickets has produced not only the erosions of the teeth, but also the cataract. This would seem to be the result of perversion in metabolism and probably the production of toxic products.

*Tardy rachitis* is the subject of a paper by Miesowicz.<sup>1</sup> The disease usually begins after the tenth year and usually expends itself on the long bones. Enlargement of the epiphyses is marked and the *x*-ray pictures of the junction of the epiphyses and the shafts of the bones are characteristic. The literature of tardy rachitis and osteomalacia is reviewed by Looser.<sup>2</sup> His studies were made upon the leg of an idiot which was amputated at the age of twenty-seven, the rickets having developed when the patient was thirteen. He believes that both conditions are due to some external cause which inhibits the action of bone formation and growth.

The value of *suprarenal glands* in the pathology and treatment of rickets has been studied by Stoelzner.<sup>3</sup> After feeding a number of children at the Berlin pediatric clinic with suprarenal substance, he reported marked improvement in rachitic symptoms. The symptoms which were in particular improved were the sweats, craniotabes, slow dentition, sensitiveness to pain, restlessness, and vasomotor irritability. Stoelzner believed this improvement to be due to the retention of lime salts after feeding with suprarenal substance. To note the truth or falsity of this theory R. Oues<sup>4</sup> performed a number of experiments with young dogs, determining the excretion of the calcium and the nitrogen. He could not determine a retention, but could observe an unfavorable influence upon the calcium metabolism, which lasted not only while the dogs were being fed, but also for some time after. A number of clinical observations have also refuted the theory of Stoelzner, and it, therefore, seems probable that suprarenal extract has no more effect on rickets than have other organic substances such as thyroidin and thymus extract. The glycosuria and arteriosclerosis noted in these and other experiments are due not only to increased blood pressure, but much more to a toxic action of the adrenalin upon the entire organism.

**Dentition.** History furnishes many examples of erroneous scientific doctrines which have persisted long after their fallacies have been demonstrated. Even after their basic principles have been displaced by well-founded arguments and facts, there are still some who will persistently adhere to them, illogical though they may be. The opinion that the first dentition produces disease has been held at all times, and by all nations and classes of people. The Hindoo mother of a thousand years ago sought to ward off the evils of dentition from her offspring by incantations

<sup>1</sup> Wiener klinische Wochenschrift, July 2, 1908.

<sup>2</sup> Mitteilungen aus den Grenzgeb. der Med. und Chir., xviii, No. 4.

<sup>3</sup> American Journal of the Medical Sciences, September, 1908.

<sup>4</sup> Zeit. f. exper. Path., 1908, v, 43.

and prayers, much as the young mother of the present day places a string of beads around the neck of her infant to abort or mitigate the health-destroying influence of teething. The idea of difficult dentition, therefore, originated at a time when nothing was known concerning the etiology and pathology of the diseases of infants, and it has been religiously handed down to the present generation. An excellent article on the doctrine of difficult dentition, written by Elterich<sup>1</sup> sets forth that there is no other subject in medicine concerning which there are so many absurd notions and superstitious beliefs. It is to be regretted that these ideas are not confined to the laity, but are also shared by many physicians. There seems to be, however, a lack of unanimity among members of the profession. Some believe that dentition produces diarrhea, but are unwilling to admit the possibility of a "tooth-cough." Others are satisfied that paralysis, convulsions, cough, and diarrhea result from dentition, but are positive that no fever ever accompanies this process. Some bring certain ophthalmias and exantheams in direct casual relation to the appearance of the eye and stomach teeth.

This is undoubtedly true regarding many physicians, even at the present day, but it is impossible to agree with Elterich that in most text-books of diseases of children, the symptomatology of difficult dentition embraces fretfulness, loss of appetite, increased salivary secretion, catarrhal stomatitis, constipation, diarrhea, slight elevation of temperature, and in severe cases otitis, meningitis, bronchitis, convulsions, local spasms, paralysis, and cutaneous eruptions. I know of no American text-book by authors of recognized standing which makes these statements. In fact, the pendulum has swung to the extreme opposite direction. Dentition is theoretically a physiological process. There is ground to doubt, however, whether it is always strictly such. It is quite true, as Elterich says, that symptoms of an indefinite character, such as wakefulness at night, fretfulness by day, loss of appetite, and general discomfort, are the most constant manifestations of infantile derangements, and may be premonitory symptoms of any disease. They are, therefore, not characteristic of dentition. The increased salivary secretion is established from the third to the fifth month, and commences, therefore, several months previous to the eruption of the first tooth, and simply indicates a stage of developmental activity preparing the digestive organs for the food which is to follow a milk diet.

Scarification of the gums was first practised by Ambroise Paré to relieve difficult dentition. It soon became and still is a popular operation. In fact, no operation in the practice of medicine has stood such a test of time. The gum was scarified not only once, but repeatedly for the same tooth. We find that no less a personage than Hunter prided himself on having scarified the gums for the same tooth not less than

<sup>1</sup> *Pediatrics*, October, 1908.



twenty times. Strange to say, this very tooth, which was blamed as the cause of convulsions in that particular patient, did not even protrude through the wound, but obstinately remained in its hiding place for some time. In 1742 Hurlicks scarified the gums of an infant ten days old, and Van Swieten relates a case in which a tooth appeared as late as eight months after the operation. During the last century this operation was so frequently and systematically carried out that it is doubtful whether any child escaped. Unhappily this operation was powerless to ward off the ravages of dentition. According to the very men who considered this operation a necessary one, the majority of deaths occurring during the first two years of life were due to the eruption of teeth. Berdmore (1770) claimed that at least one-half of the deaths occurring before the age of six months were due to dentition, and even during the middle of the last century, West, the famous London physician, allowed 7 per cent. of his cases to die of difficult dentition.

It was not until 1797 that a vigorous protest was filed against the doctrine of difficult dentition. This was by Johann Wichman, of Göttingen, Germany; later by Elsaesser, and more recently by Kassovitz and others. Wichman was of the opinion that the doctrine was the result of lack of ability to properly diagnosticate the various symptoms and diseases of infants; that it was very convenient to blame a factor which was always sure to be present at that period, and even in those cases in which a proper knowledge of the disease existed it proved a very convenient scapegoat in case of a fatal termination. He demonstrated that in a majority of cases, at the place where the tooth was about to pierce the gum, there was no inflammation, but on the contrary, a small white point could always be seen, which was painless on pressure.

There can be little doubt that pediatric practice would be greatly benefited if every physician in the land could practically subscribe to Elterich's conclusion that skepticism regarding the doctrine of difficult dentition does no harm, but, on the contrary, is conducive to better results by demanding a more careful and systematic examination of infants ill from any disease.

**Blood Pressure in Children.** The frequency and character of the pulse have been observed for many years both in health and disease, but studies of vascular tension are more recent, and comparatively few observations have been made upon the blood pressure of children. Stowell<sup>1</sup> reports observations made on 216 patients in hospital and private practice. The instrument used was the Riva Rocci with a broad arm band. From these observations it is evident that the vascular tension is lower in childhood than in adult life. The averages are, in health:

<sup>1</sup> Archives of Pediatrics, February, 1908.

Years.	Millimeters.
3 . . . . .	91
4 . . . . .	98
5 . . . . .	95
6 . . . . .	96
7 . . . . .	102
8 . . . . .	101
9 . . . . .	102
10 . . . . .	112
11 . . . . .	102
12 . . . . .	111
13 . . . . .	107
14 . . . . .	110
15 . . . . .	109
16 . . . . .	117
17 . . . . .	103

Stowell concludes that pressure in the young is comparatively low; that its rise and fall are quickly influenced by emotions, as in adults; that diseases of the nervous system give high pressure; that acute diseases with high temperature may give either high or low pressure; that blood pressure readings are of interest physiologically, but have little clinical value in childhood.

**The Blood in Infancy and Childhood.** In a paper based on a large number of observations of the blood in children, A. D. Smith, of Brooklyn,<sup>1</sup> states that the blood of children in health and disease differs considerably from the blood of the adult. At about the sixth year the blood becomes nearly like that of the adult. In the newborn the red cells number 6,000,000 per cmm. At the end of the first day they drop to 5,500,000, and at the end of the second week to 5,000,000, which is the normal adult count. Nucleated red cells are constantly present during the first few days of life. The hemoglobin at birth is 110 per cent. It gradually falls until the sixth month, when it averages 70 per cent., slowly rising again until the sixth year, when it averages the same as the adult. The white cells at birth show a count of 20,000 per cmm. At the end of the first week, they are 10,000; at the sixth month, 15,000; at one year of age, 12,000; and at the sixth year, 7500. At birth the granular white cells are present in the proportion of 75 per cent., and non-granular cells make up the other 25 per cent. At the end of the first week the granular cells have fallen to 45 per cent., and the non-granular have risen to 55 per cent. At the end of the third year the two varieties are nearly equal. At the sixth year the proportion is the same as in adult life.

As regards the effects of the various diseases on the blood, Smith's conclusions are as follows: (1) In gastroduodenitis there is a leukoplasmia with a marked relative diminution in the granulars, and marked

<sup>1</sup> Pediatrics, October, 1908.



relative increase in the non-granulars. (2) In *oxyuris vermicularis*, as with other intestinal parasites, there is an eosinophilia. (3) In acute bronchitis there may or may not be a leukocytosis. There is a relative decrease in the granulars, and relative increase in the non-granulars. (4) In bronchopneumonia and in lobar pneumonia there is a leukocytosis, with a relative increase of the granulars and a relative decrease in the non-granulars. (5) In chorea the hemoglobin is markedly reduced. There is a slight increase in the white blood cells, and a relative decrease in the granulars, and a relative increase in the non-granulars. (6) In splenic anemia of infancy the hemoglobin is markedly reduced. The red blood cells are reduced, but not to the extent corresponding with the hemoglobin. There is poikilocytosis, and megalocytes and microcytes, normoblasts and megaloblasts are present, but a relative diminution or no change in the granulars and a relative increase or no relative change in the non-granulars. The eosinophiles are increased and myelocytes are present. (7) In purpura hemorrhagica there is a reduction in the hemoglobin and the red blood cells, and the blood plates are so much reduced that in some cases prolonged search fails to reveal any. The granulars are relatively decreased, and the non-granulars are relatively increased. (8) In pertussis there is a leukocytosis, sometimes marked, and a relative decrease in the granulars, and a relative increase in the non-granulars. With the development of pneumonia there is a reversal of the relationship, a relative increase in the granulars and a relative decrease in the non-granulars.

The diseases in which the diagnosis can be made from the blood alone are splenic anemia of infancy, purpura hemorrhagica, malaria, and pertussis. In nearly all the other diseases, however, while not furnishing the diagnosis, the blood shows itself to be of help in furnishing the differential diagnosis. In discussing this paper, Woglom<sup>1</sup> asserted that pertussis can be diagnosticated by the blood count in 9 cases out of 10 before the whoop appears.

**The Temperature in Infants.** Extensive observations on the daily variations of the temperature in infants are reported by Gofferje.<sup>2</sup> From 6 A.M. to 6 P.M. the temperature is commonly on a higher plane than it is between 10 P.M. and 4 A.M. The most instructive temperatures are those taken at 2 and 10 A.M. and 6 P.M. The axillary temperature is to a certain extent a record of muscle activity, and is higher when the child is awake and active. Illness marked by fever may affect the daily variations in one of three different ways. The most common type of fever is that in which the normal comparative night reduction does not take place or an actual rise occurs. This type is commonly seen in digestive disorders. Another type is marked by a continuous temperature showing but little variation from the day level. Such a temperature

<sup>1</sup> Pediatrics, October, 1908.

<sup>2</sup> Jahrbuch f. Kinderheilkunde, August, 1908.

is commonly seen in the infectious diseases. It sometimes occurs that the temperature at night continues at the day level, even when other symptoms have subsided. A third type is that in which the typical day and night variations are greatly exaggerated.

Several excellent articles have appeared upon *obscure fever in infancy and early childhood*. Among the best of these are the articles of Morse,<sup>1</sup> Ashby,<sup>2</sup> and Cantley.<sup>3</sup> Morse considers the peculiarities of temperature in children in typhoid fever, malaria, endocarditis, otitis, pyelitis, and several other conditions. He speaks particularly of the fever which accompanies tuberculosis of the internal lymph nodes and chronic diffuse tuberculosis. Tuberculous disease of most other organs usually runs a definite and comparatively rapid course in children. These obscure tuberculous conditions in children are often impossible of diagnosis without tuberculin tests. Morse believes, however, that obscure tuberculosis is seldom the cause of long-continued fever in childhood. He believes such fevers to be more frequently due to disorders of the digestion or metabolism. These cases of persistent though perhaps not high elevation of the temperature are frequently exceedingly trying. They are more often due to a mild grade of intestinal toxemia than to any other cause. While acute digestive disorders are comparatively easy of diagnosis, and are accompanied by a high temperature, these chronic cases frequently present very few symptoms which point to the digestive organs. Differences of opinion are very great as to what element of food is concerned in the development of this condition. It has been attributed to the proteid, the carbohydrates, and the fat. It is believed by some that milk is an active factor. Morse leans to the belief that in most instances decomposition of the proteids is the most important factor. He withdraws the proteids in such cases and places the child upon a milk and starch diet, and seeks especially to secure proper hygiene. The use of mild laxatives is also an important factor of treatment. He attributes the good results to a change in the culture media which modifies the intestinal flora. Buttermilk is often useful in such cases, probably for the same reasons. Ashby lays particular stress upon the gastro-intestinal source of obscure fever and also upon pyelitis. Other causes of such fever which are readily overlooked are small patches of pneumonia, local empyema, influenza, and septicemia from absorption by the tonsils or nasopharynx.

No case of obscure fever should be allowed to pass without careful examination of the throat and ears. The tonsils may be the source of an infection without an exudation or the symptoms of follicular tonsillitis. The ears are perhaps the source of more unexplained fevers in children than any other single cause. Otitis in young children may

<sup>1</sup> Boston Medical and Surgical Journal, July, 1908.

<sup>2</sup> British Medical Journal, December 7, 1907.

<sup>3</sup> Lancet, September 12, 1908.



occur without pain, tenderness, or any other symptom pointing to the ears.

**Recurrent Vomiting.** But little has been added to our knowledge of this distressing condition. Hecker<sup>1</sup> discusses the subject under the title of *periodic acetonemia*. The attacks of vomiting which occur when the acetone content of the blood is increased are very characteristic. They occur periodically, and the child is in comparatively good health during the interval. Boys are more frequently affected than girls. The vomited matter, which at first consists of partially digested food, soon becomes mucous in character and is frequently tinged with blood or bile. The weight diminishes rapidly and the patient suffers from intense thirst. He is unable, however, to retain anything upon the stomach. Medicinal treatment is unavailing, for everything administered is immediately rejected by the stomach. The attacks continue from two to three days or occasionally longer. While the attack is in progress the breath has the peculiar sweet odor of acetone. The urine contains acetone in large quantities and also diacetic and oxybutyric acids. These disappear when the attack has run its course. Of the cases reported by Hecker fever was not common. In my own experience fever has been the rule, and has sometimes ranged very high. Hecker's patients were between three and eleven years of age, and in that his experience coincides with that of American physicians. He believes that the disease results from some constitutional peculiarity, probably imperfect power to break down the fats, and may depend upon some disturbance in the leukocyte system. In other words, he regards it as a developmental defect, chiefly centred in the lymphatic system. He found that alkalies freely administered accomplished more than any other form of treatment, being more useful in some cases than in others. He advises a dry diet with little meat, together with hydrotherapy and hygienic management. In my own experience alkalies have proved brilliantly successful in a few instances. In other cases they have shown but moderate results. Large doses of bicarbonate of soda administered every two hours well diluted are so efficacious in some cases that they should be given a trial in every case.

Göppert<sup>2</sup> reports a case of *habitual vomiting* in an infant of four months which he believes was due to cardiospasm. The child was treated by gavage, the tube being passed through the nose. Food thus administered was retained, and the difficulty gradually disappeared.

**Infant Foods.** Pediatric opinion is overwhelming that in cows' milk we must seek the substitute for breast milk. This view is well expressed by McAllister,<sup>3</sup> who holds that every new step in the progress of substitute feeding of infants during the past fifty years has led the medical

<sup>1</sup> Münchener med. Wochenschrift, July 14, 1908.

<sup>2</sup> Therapeutische Monatshefte, August, 1908.

<sup>3</sup> Medical Record, July 11, 1908.

practitioner to a position closer to whole milk. That was where the circle began and that was the logical ending. Powders of cereal origin, condensed milk, sterilized milk, pasteurized milk, laboratory milk, home modified milk—milk that has been the whole round. He does not favor a wholesale and indiscriminate return to the use of raw market milk nor the use of none but whole milk in general substitute feeding, but only ideal milk for the very young and delicate. Simple methods of dilution or modification, possible in any home, yield superior results because of the greater ease with which fresh milk can be digested. On every market this ideal milk can be had for the price of the searching.

The last year has exceeded even the year preceding in the interest which has been manifested in a clean milk supply, an interest which was first felt and expressed by pediatric practitioners. Not only medical literature, but the daily press has teemed with articles upon the subject of a pure milk supply. It is impossible to cover the subject in the space allotted in these pages. Brief reference only can be made to a few of the many articles which have been published. Johnston, of Bradford,<sup>1</sup> calls attention to the fact that the milk supply involves two wholly different classes of business, dairying and distributing. Errors in either of these departments may contaminate the supply. The work of regulating these two classes of business has been especially active in New York City. An admirable summary of the requirements necessary for a clean milk supply of a great city is contained in a report to the Mayor of New York made by an admirable commission appointed by him, consisting of Holt, Jacobi, Bryant, Prudden, and Freeman.<sup>2</sup> The results obtained by rigid inspection of milk in New York City are presented in an excellent article by Russell Raynor, Chief Sanitary Inspector.<sup>3</sup> The Health Department methods for the supervision of the milk supply of Washington are described by Woodward,<sup>4</sup> Health Officer of the District of Columbia. The regulation of a rural milk supply is considered in an excellent article by S. W. S. Toms.<sup>5</sup> W. E. Burton<sup>6</sup> has also written upon the same subject.

In an article on "Infant Mortality," Deutsch<sup>7</sup> refers particularly to milk stations for infants and lays stress upon the importance of clean milk. A peculiar condition arose not long since in Paris through the attempted sale by Baron Rothschild of sterilized milk at less than cost price to the poor. He attempted to follow the work of Strauss, of New York, but the Paris milk dealers brought suit, alleging dishonest competition in the sale of milk. The courts decided in their favor, and the

<sup>1</sup> New York State Medical Journal, January, 1908.

<sup>2</sup> Archives of Pediatrics, February, 1908.

<sup>3</sup> New York State Medical Journal, May, 1908.

<sup>4</sup> American Medicine, July, 1908.

<sup>5</sup> New York State Journal of Medicine, March, 1908.

<sup>6</sup> Journal of the American Medical Association, February 22, 1908.

<sup>7</sup> Archiv f. Kinderheilkunde, September 28, 1908.



sale of "philanthropic milk" was forbidden under penalty of a fine.<sup>1</sup> An excellent article is contributed by Coit,<sup>2</sup> the founder of commissions of medical men for the production of certified milk. The American Association of Milk Commissions is an organization doing admirable work. Its organization and aims are described by Geier.<sup>3</sup> An excellent article on sanitary milk is that of Heinemann.<sup>4</sup>

A notable editorial article by H. A. Hare<sup>5</sup> considers certain vital properties of milk. It has been demonstrated that new milk possesses bactericidal influence, and inhibits the growth of germs in a manner which boiled milk does not exercise. A great advantage of breast milk is that its inhibitory power is absolute for more than an hour after its ingestion, and almost absolute for the second hour, and during this time the process of digestion has taken place. There is, therefore, but little opportunity for the growth of microorganisms. Milk which is taken twelve hours after it is obtained possesses less power. Boiled milk exercises no restraint over bacterial growth, and any arrest in the growth of microorganisms is produced solely by the digestive juices. Preserved milk—that is, milk containing any of the preservatives—arrests the bacterial properties of the milk. In other words, a milk which has its inhibitory power damaged is reduced to the level of boiled milk and acts as a medium for the unrestrained growth of organisms, save for the check of the digestive juices. As Colpans well says, every feeding of milk from the breast tends to diminish the growth of microorganisms in the alimentary canal. Therefore, breast feeding aside from any advantage it may have from other points of view, aids in diminishing bacterial growth and in keeping the child's digestive system in a state of health. The results obtained by St. John and Pennington<sup>6</sup> in a study upon the influence of *pasteurized milk* upon the growth of bacteria are referred to. They conclude that ordinary milk possesses a distinct restraining power upon the microorganisms ordinarily found in it, and that heating this milk to 79° C. materially impairs or destroys this influence. The practical conclusion for the practitioner to arrive at from these researches would seem to be that, given fairly pure milk, it is better not to be pasteurized, but if it is pasteurized, it should be done just before the child uses it. If it is pasteurized some hours before, and is exposed to infection, it is so favorable a field for the growth of microorganisms, in view of its impaired bacteriolytic power that it is qualified to produce grave illness. In other words, commercial pasteurized milk is practically capable of producing deleterious effects.

<sup>1</sup> Journal of the American Medical Association, March 28, 1908.

<sup>2</sup> Kentucky State Medical Journal, May, 1908.

<sup>3</sup> Journal of the American Medical Association, May 2, 1908.

<sup>4</sup> Archives of Pediatrics, June, 1908.

<sup>5</sup> Therapeutic Gazette, February, 1908.

<sup>6</sup> Journal of Infectious Diseases, November 15, 1907.

The same writer in a later issue again reviewed this important subject editorially,<sup>1</sup> as the position taken in the first article had been confirmed by the exhaustive studies of Rosenau and McCoy.<sup>2</sup> These observers state that when milk is kept warm a decrease in the number of organisms which are placed in it occurs within the first eight or ten hours. When milk is kept cool this decrease is more pronounced, but more prolonged. They also state that the polymorphonuclear leukocytes seem to possess the power of phagocytosis. They found that the germicidal action of blood and milk resemble each other in some particulars, although blood serum acts more powerfully and more quickly than does milk. It is an interesting fact that freezing milk even for considerable periods does not materially affect its bactericidal power, while, on the other hand, heating it above 80° C. destroys such power. This germicidal effect of fresh milk cannot be relied upon to keep it pure, but it can be utilized to advantage together with cleanliness and the use of ice in maintaining milk as a pure food.

Closely allied to this subject is the fact recently pointed out,<sup>3</sup> that the blood of a newly born infant is abundantly supplied with bactericidal elements which diminish after birth, but rapidly rise after four or five days under the influence of maternal nursing. In artificially fed infants, on the other hand, they markedly decrease, falling more rapidly in those who are doing poorly. This is, in part, an explanation of the well-known fact that breast-fed infants do better than artificially fed infants.

After studying these ferments of cows' milk, Freeman<sup>4</sup> asserts that a temperature of 140° F. (60° C.) scarcely alters the chemical composition of milk, and does not injure the ferments which it contains. The most recent observations made on the thermal death point of the tubercle bacillus, the most resistant species that we fear in milk, indicate that a temperature of 140° F. for twenty or thirty minutes is sufficient to destroy tubercle bacilli occurring in milk, unless they are developed in thick, mucopurulent material, such as sputum, or protected by a film formed on the surface of the milk. Such conditions are not likely to occur in sealed bottles of properly handled milk from healthy cows. It has, therefore, seemed to Freeman advisable to advocate the pasteurization of milk at not less than 140° F. for forty minutes. Such milk is unaltered in taste and retains the ferments and biological characteristics of the milk unimpaired. It is not subjected to chemical change, and is certainly much safer than any raw milk at the present stage of dairy hygiene in this country or abroad.

<sup>1</sup> Therapeutic Gazette, August, 1908.

<sup>2</sup> Journal of Medical Research, March, 1908.

<sup>3</sup> Edinburgh Medical Journal, April, 1908.

<sup>4</sup> Journal of the American Medical Association, November 23, 1907.



In a study of the *distribution of bacteria in bottled milk*, Hess,<sup>1</sup> of New York, states that the bacteria are by far the most numerous in the upper layers of the cream, becoming gradually fewer in its lower portion. The upper two ounces contains the greater number of bacteria. This is true of tubercle bacilli as well as of streptococci and other bacteria. Therefore, instead of using the upper cream, as is now practised, he believes that it is preferable to discard the upper two ounces. The average bottle of such partially skimmed milk contains 3 per cent. fat and 3.5 per cent. proteid, and is well adapted for infant feeding. If we discard the upper two ounces we have: Next seven ounces, a 12 per cent. milk; next eight ounces, a 10 per cent. milk; next twelve ounces, a 7 per cent. milk. With these figures as a basis, the usual top milk formula may be prepared. In discussing the subject, Freeman<sup>2</sup> said that his experiments agree with those of Hess in that there are more bacteria in the upper layers of cream than in the lower, but he has found much greater increase in bacterial contamination takes place at the cream line, there being many bacteria just above the cream line and very few below. While most centrifuged milk shows this separation of bacteria with the cream, this is not always true. His suggestions with respect to the practical application of these facts differ from those of Hess, in that he has suggested the using of skimmed raw milk and the pasteurizing only of the cream.

**Breast Feeding.** The importance of breast feeding is strongly urged by Burnet.<sup>3</sup> He believes that artificial foods should not be used before the tenth month unless through strict necessity. He approves highly the system of infant milk depots, but thinks that no milk should be supplied to women who are able to nurse their children. Otherwise the milk depot may, in some instances, be productive of harm. Snyder, of Birmingham,<sup>4</sup> also writes upon the subject, and expresses the fear that we are giving an excessive amount of attention to cows' milk to the neglect of breast milk. So great is this neglect in some quarters that we seem to be better equipped as veterinarians than as physicians.

While the importance of a clean and wholesome milk supply is very great, it must be admitted that there is frequently a grave neglect on the part of practitioners of the measures which might make breast feeding possible. Artificial feeding is too often resorted to when proper regulation and directions to the mother would render it unnecessary. The value of breast feeding, even for a short period, cannot be too strongly insisted upon. E. V. Davis<sup>5</sup> after studying the quantity and quality of breast milk during the first two weeks of the puerperium, concludes that the early secretion from the mother's breast is so useful in sustaining the child that nursing should be encouraged from the first day of life

<sup>1</sup> Archives of Pediatrics, August, 1908.

<sup>2</sup> Ibid.

<sup>3</sup> American Practitioner and News, April, 1908.

<sup>4</sup> Journal of the American Medical Association, October 10, 1908.

<sup>5</sup> Ibid.

in every possible case. When the milk is abundant, she believes that a three-hour interval soon becomes the shortest proper interval during the day for breast feeding, with a longer interval at night. The digestive capacity of the child and the quality of the breast milk should be given more consideration than it usually receives. The length of the intervals between feedings is the subject of an excellent paper by Grulee.<sup>1</sup> He urges a longer interval than is commonly accepted by most authorities, believing that the four-hour interval between feedings for infants possesses the following advantages: (1) It enables the stomach to have a period of rest between feedings. (2) It makes possible an antiseptic action by the free hydrochloric acid of the gastric juice. (3) It trains the child to longer periods of rest between feedings. (4) It is a strong factor in the prevention of overfeeding. (5) It acts in a striking manner in overcoming certain cases of vomiting caused probably by the failure of the stomach to obtain rest under previous conditions. It is safe to conclude that the necessary increase in the amount of feeding does not cause a distention of the stomach, and that such a method of feeding is perfectly compatible with a consistent gain in weight. If we add to these advantages the practical one that the mother or nurse is put to less trouble, it would seem that a lengthened interval between feeding would at least deserve a wider attention and more consistent trial.

**Artificial Feeding.** Although a considerable number of papers have appeared during the past year on infant feeding, the literature of the subject has not been as extended as in some previous years. In fact, but little new and valuable material has been added to the subject. At the last meeting of the American Pediatric Society, for example, among thirty-two papers but three were devoted to infant feeding and two to laboratories and milk depots. Owing to recent epidemics and laboratory studies, cerebrospinal meningitis and poliomyelitis have especially attracted the attention of pediatric practitioners. Tuberculosis has also received much attention from them.

In discussing fallacious standards employed, Pisek<sup>2</sup> draws attention to the fact that before the science of artificial feeding can become established, elementary principles must be worked out which everybody can accept, not because they are supported by authorities, but because their correctness can be demonstrated. In other words, the principles must be able to stand alone. All sciences must pass through a formative period in which their basic principles are discussed. The science of infant feeding is in such a period. It will probably always be necessary to use milk in feeding infants; adjusting percentages more or less accurately will never go out of practice; alkalies will have their use; it will be a long time before pasteurization or sterilization will not be used; the

<sup>1</sup> Archives of Pediatrics, October, 1908.

<sup>2</sup> Journal of the American Medical Association, October 10, 1908.



use of small quantities of casein, as in whey mixtures, will always be useful at times; the gain or loss of weight of infants will still have to be watched, but some of the theories upon which these procedures have been based will have to be abandoned. Pisek questions why we should not take the successful methods of practice, ascertain the principles involved in their use, and from these build up the science of infant feeding. It would become simple and would easily be grasped, and the efforts now devoted to supporting various theories could be used in other fields. Slow and steady advancement is undoubtedly being made, but much of the energy expended seems to produce but little result.

During the past year or two the fat of cows' milk has been the popular subject of investigating and writing, and many radical and untenable theories have been presented regarding it. The same may be said of almost every subject connected with artificial feeding. Crude observations and undemonstrated theories are made the basis of articles which appear in many reputable journals. The subject seems especially to tempt writers into extreme and sensational statements. It must be frankly said that the advancement in the ability to feed children has not been in proportion to the enormous amount of literature which has been produced. The unnecessarily contradictory statements which are so prevalent must certainly lead the general practitioner to feel that the subject of infant feeding is a most uncertain one and tends to drive him into the use of patent foods. Lamb,<sup>1</sup> of Cincinnati, asserts that the percentage method of feeding is uncertain, complicated, and unscientific; that fat is the element in cows' milk to be feared, as it produces constipation, which proteids never do; that casein is not difficult to digest, does not produce digestive disturbances, and does not undergo putrefaction in the intestinal canal; that curds in the stools are not proteid, but calcium soaps, fatty acids, or fats; that newborn infants can digest starch; that the interval between feedings should never be less than three hours; and that the exact amount of food taken by a child can be determined only by calculating energy quotients.

In discussing the use of fat-free milk in infant feeding, Townsend<sup>2</sup> concludes that while fat is very necessary to the normal infant, it is more often given in excess than is generally supposed. Excess of fat may cause one or more of a number of symptoms, as, for example, constipation, white and "curdy" stools, a ravenous appetite, with atrophy and convulsions. In gastro-intestinal disturbances it is desirable to exclude fat. The proteids of undiluted fat-free milk appear to be remarkably well borne even by young infants, and there is an absence of so-called curds from the stools.

In speaking of *fat incapacity* in infants, Howland<sup>3</sup> asserts that the

<sup>1</sup> Archives of Pediatrics, June, 1908.

<sup>2</sup> Boston Medical and Surgical Journal, March 19, 1908.

<sup>3</sup> Archives of Pediatrics, March, 1908.

symptoms due to an excess of fat may be gastric, intestinal, and constitutional. The intestinal symptoms are many. In the mildest instances the stools contain larger or smaller white masses called "curds," and erroneously supposed to be lumps of casein. These can be proved chemically to be in the great majority of instances insoluble soaps of the fatty acids. In more marked instances constipation is the rule and is characteristic. The stools are then usually large, dry, light gray or white in color, foul in odor, and alkaline in reaction. The apparent lack of bile has been explained by Langstein, who has recently demonstrated that white stools are not acholic, but that owing to the alkaline reaction the bilirubin, instead of being transformed into urobilin, is changed to a colorless urobilinogen. The foulness arises from the increased putrefaction allowed in the alkaline medium and from the delayed stay of the fecal mass, for with such stools such children are very constipated. The saponification of the excess of the fatty acids demands alkalies, and these are lost to the organism, a fact of the greatest importance. Steinitz had been able to show with great exactness that a diet rich in fat causes regularly a loss of alkaline by the intestines, and that the alkali excreted is greater than that ingested in the food.

In discussing the same subject, J. L. Morse<sup>1</sup> said that he feared some of these statements regarding fat might give a wrong impression to those not familiar with infant feeding. Everyone who has had experience in infant feeding knows that too much fat causes these symptoms. On the other hand, they know that a normal breast-fed baby gets 4 per cent. fat in its food. They also know that they have fed babies for years on modified mixtures containing from 3 to 4 per cent. fat, and that the vast majority of these babies have done well on these percentages. Those who do not do well are the ones who are getting 6, 8, 10, and even 12 per cent. of fat in their food. It is not the ordinary and proper amount of fat that does harm, but the excessively large amount of fat which is often given. He mentioned one clinical fact in connection with the symptoms of fat indigestion in babies; that when there is ammonia in the urine it is diminished by diminishing the amount of fat in the food.

Freeman<sup>2</sup> said that in infant feeding the element in the milk most often giving trouble is the *proteid*. In spite of the fact that the curds in the milk are found to consist of fats, soaps, and fatty acids, they are evidence of defective proteid indigestion, because if one makes the proteids more digestible the curds diminish. Peptonizing, or the addition of cereal diluents, often cause the curds to disappear. Southworth<sup>3</sup> stated that these masses, when examined microscopically and chemically, may be found largely to consist of fatty acids and soaps. But they do not originate that way. When milk is subjected to the action of rennet and acid, fat becomes enclosed in the meshes of the paracasein curd

<sup>1</sup> Archives of Pediatrics, March, 1908.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.



and there are present both proteid and fat. As this mass passes through the intestine there occurs a great deal of proteid decomposition due to bacterial action, and some of the proteids disappear. Hard curds originate as milk curds containing both fat and proteids. After an extended study upon the same subject, Talbot<sup>1</sup> concludes that the large curds in infants' stools are composed of some proteid (probably casein or one of its derivatives), which on coagulating entangles the milk fat in its meshes. The amount of fat in the curds depends upon the amount of fat in the milk, and as the fat increases it replaces the proteid in the curd. The presence of large curds, which has been taken by some observers to indicate an increase of gastric HCl, can with as great probability be taken as indicating a lack of HCl. Scheible<sup>2</sup> asserts that the amount of fat absorbed by an infant can be determined by certain blood tests which he describes. The absorption reaches its highest point in the second and third hours after feeding. Examination may determine, therefore, the amount of fat which is being absorbed.

In discussing *carbohydrate incapacity* in young children, Kerley<sup>3</sup> reasserts his belief that the capacity of certain children for starches and sugars is extremely limited, some being very susceptible to their deleterious effects. The cane-sugar capacity of older children varies very decidedly. Some will take from four to eight ounces a day without inconvenience. In others a few grains will produce marked disturbance. The so-called lithemic children, the children with what Rachford calls the incompetent liver, are all sugar susceptibles.

The most usual manifestation of sugar poisoning is a persistent hyperemia of the mucous membranes of the upper respiratory tract. Recurrent rhinitis, tonsillitis, and bronchitis are seen most frequently in sugar susceptibles. Children who have eczema, frequent urticaria, rheumatism, and recurrent vomiting have a very poor sugar capacity.

The necessity of a *proteid standard* in infant feeding is urged by T. G. Allen.<sup>4</sup> The need of greater accuracy in prescribing starch is the subject of a paper by Ladd.<sup>5</sup> Modern laboratory feeding is discussed by Rotch,<sup>6</sup> who points out the wide range of resources which it provides. After seventeen years of experience the laboratories have proved a valuable aid in infant feeding and have been important factors in developing improved methods. A paper criticising percentage methods of feeding and taking grounds radically different from that of Rotch is offered by Brennemann,<sup>7</sup> who presents, however, no other nor simpler method. Buttermilk feeding, upon which so much was written a year or two ago, has received but little attention in recent months. An excellent review

<sup>1</sup> Boston Medical and Surgical Journal, June 11, 1908.

<sup>2</sup> Münchener medizinische Wochenschrift, March 10, 1908.

<sup>3</sup> Archives of Pediatrics, March, 1908.

<sup>4</sup> Ibid., December, 1907.

<sup>5</sup> Ibid., April, 1908.

<sup>6</sup> Ibid., September, 1908.

<sup>7</sup> Journal of the American Medical Association, July 11, 1908.

of the subject, with methods of preparing and keeping buttermilk, is given by England.<sup>1</sup> Kefer is commended by Dresler<sup>2</sup> as an excellent acid preparation of milk suitable for infants, both sick and well. It is inexpensive and is not modified by hot weather. He believes that it possesses all the advantages of buttermilk, with few of its disadvantages. The method of preparation is fully described. The caloric value of modified milk in its relation to infant feeding is the subject of an admirable paper by Ladd.<sup>3</sup>

<sup>1</sup> Monthly Cyclopedia of Practical Medicine, April, 1908.

<sup>2</sup> Medizinische Klinik, July 5, 1908.

<sup>3</sup> Archives of Pediatrics, March, 1908.





# RHINOLOGY AND LARYNGOLOGY.

BY D. BRADEN KYLE, M.D.

## THE NOSE.

**Atrophic Rhinitis.** Much confusion exists in the nomenclature of this condition, largely due to the fact that different individuals apply the term "atrophic" to entirely different processes. One thing certain is that there are forms of atrophy peculiar to the nasal mucous membrane, and some of these conditions are associated with ozena. Why do we not have this condition of atrophy in other mucous membranes? This certainly does not exist, and it forces us to the conclusion that either the mucous membrane itself or its function predisposes this membrane to an atrophic change or changes.

Personally, I believe there is no one cause of atrophic rhinitis, but that there are many conditions, both external and internal, that lead to pathological changes in the nasal mucous membrane, and bring about the condition known as atrophy. Seen at different stages, it will be described as a different variety; yet the ozena, which is associated with some cases and not with others, may have its origin in the altered secretion, in the secretion, even, of the glands of the mucous membrane, or may come from an involvement of an accessory cavity. This accessory cavity involvement may be primary, or it may be secondary.

Very few observers have had the opportunity of studying a case from its beginning. It is always developed before the physician sees it. I have seen many cases of atrophic rhinitis with ozena, in which there was no involvement of the sinuses, but in other cases I have observed the ozena without any atrophy, in which there was involvement of the sinuses; so that it brings us to this conclusion: That we may have atrophic changes with ozena; we may have atrophic changes without ozena; we may have ozena and atrophic changes in which there is an associated lesion of the sinuses, either primary or secondary. We may also have associated lesions of the sinuses with ozena, in which there is no atrophic changes in the nasal mucous membrane, and while the process when completed may be the same, yet the causes are different, and no one definite etiological factor can be assigned.

On examination of the tissue taken from atrophic cases, in some instances the tissue itself, even after removal, still has the odor so characteristic of ozena. This would seem to point to some chemical change in



the gland structure. The odor of atrophic rhinitis varies, and I think is due to different causes in different cases. Various bacteria have been found, but the same bacteria can be obtained from decomposed secretions elsewhere.

The mucous membrane of the accessory cavities secretes very little mucus, and if these cavities are inflamed, then the secretion is not mucus, but an inflammatory product. The mucus secreted from the nasal mucous membrane under normal physiological conditions does not tend to form crusts and adhere to the mucous membrane. In atrophic rhinitis, with or without ozena, this, however, is the case, showing an altered mucous membrane and altered gland structures, with necessarily altered secretion. That this secretion is altered is proved when an attempt is made to thoroughly cleanse the mucous membrane. This, as we all know, it is practically impossible to do in an atrophic case.

Atrophic rhinitis usually begins in childhood, and it is possible that the blood supply is sufficient up to a certain period of development, and then, owing to faulty formation, as some of the blood supply comes through bony foramina, these may not develop sufficiently large to allow adequate nutrition to be carried to the part; hence the atrophic change.

Heredity and the general condition play an important part as etiological factors. I think, however, that we can sum up the whole question as follows: That there is not any one etiological factor responsible for atrophy of the nasal mucous membrane; that the source of the odor in the condition known as ozena has no one origin; that there may or may not be an associated sinus lesion, either primary or secondary to the atrophy or ozena; that we do have an atrophic condition which follows a simple chronic inflammation with contraction; that we do have an atrophic condition due to faulty nutrition from other causes; that we do have an atrophic rhinitis which is truly an atrophic change. We may also have an atrophic rhinitis similar to that condition seen in the liver, which is known as red atrophy, in which the membrane, although puffy and cyanotic, is strictly atrophic as to function and cellular structure, brought about by venous stasis. No specific bacteria will account for all cases of atrophy of the mucous membrane or all cases of ozena.

Clement F. Theisen<sup>1</sup> considers the etiology of atrophic rhinitis from the viewpoint of *accessory sinus disease*, the so-called "Herd" theory. While he does not claim that all cases can be explained upon this basis, he is convinced that a large percentage of the cases of atrophic rhinitis are associated with disease of the accessory sinuses. He gives the results of his observations in a series of 60 cases, 21 of which have been previously reported. These were all cases in which the characteristic atrophy of the membrane with crust formation was present. In 8 of the 21 cases first reported, positive evidence of sinus disease was found.

<sup>1</sup> Laryngoscope, June, 1908.

In 4 cases chronic maxillary sinusitis, in 2 combined with chronic ethmoiditis, existed. In 3 cases, ethmoiditis existed alone (cases of unilateral atrophic rhinitis), and in 1 case chronic frontal sinusitis and ethmoiditis. In the 3 cases in which the ethmoidal cells were found diseased, the atrophic process was practically confined to the middle turbinal body, and in these cases a direct etiological relationship certainly appeared to exist between the ethmoid disease and the localized atrophic changes. These cases were greatly benefited by curettage of the ethmoid cells.

In the second series of 39 cases, accessory sinus disease was found in 6 cases. In 2 cases ethmoid and antral disease was found, in 2 ethmoid disease alone, in 1 frontal and ethmoid, and in 1 ethmoid and sphenoid. In this series of cases, also, in the 2 cases in which ethmoid disease was found, the atrophic process was practically limited to the region of the middle turbinate. These observations show that accessory sinus disease was present in 14 out of 60 cases of atrophic rhinitis, or 25 per cent.

The method used in arriving at these results was briefly as follows: In every case as thorough an investigation as possible of the accessible sinuses was made. The nostrils of each patient examined were first freed of crusts and thoroughly washed out, and then transillumination was employed. The maxillary antra in all cases in which the patient's consent could be obtained, were punctured in the usual way through the naso-antral wall and washed out. In the cases in which it was found that antral disease existed, decomposing and usually foul-smelling secretions were washed out. The diagnosis in the cases in which chronic frontal sinusitis was found, was made by transillumination and by washing out the sinus when possible. In 1 of these cases the radical operation was performed, and a greatly thickened and degenerated membrane with some pus was found. The nasal condition was greatly benefited by the operation. In one case in which ethmoid disease had been found a large sequestrum was removed. It was part of the left lateral ethmoid mass. The ethmoid cells were filled with a thick, foul-smelling secretion. This patient was probably a syphilitic subject.

Theisen's conclusions are that the "Herd" theory offers the most reasonable explanation for a fairly large percentage of atrophic rhinitis cases. None of the other theories, the rarefying osteitis theory, the theory that the atrophic process follows a previous hypertrophy of the membrane, and others too numerous to mention, give a satisfactory explanation for the large amount of secretion necessary to form the large crusts we see in some cases. The function of the mucous glands must certainly be seriously interfered with when they become destroyed, as they do in severe cases, because microscopic examinations do not show glandular elements in tissue atrophied to the extent that it is in certain advanced cases of atrophic rhinitis. The secretions in many of these cases must come from the neighboring sinuses. If the theory that a rarefying osteitis,



producing a shutting off of the blood supply to the mucous membrane, is correct, why should it in some cases produce atrophy, and in others just the opposite condition, edema and polypoid degeneration of the membrane?

Robert C. Myles<sup>1</sup> divides atrophic rhinitis into three stages: (1) The mucopurulent stage of childhood. (2) The incrustation or ozena stage, which develops in patients between four and sixteen years of age, and never afterward in patients observed by him. (3) The adolescent stage, which may be observed from the age of twenty-five to the end of the oldest life. The proposition that the early or incipient stage is the best one in which to treat a case of tuberculosis, cancer, diphtheria, and numerous other diseases, should hold equally well in atrophic rhinitis. Myles has never been able to make or to find in recorded literature a complete clinical history of a case of atrophic rhinitis. Bosworth's remarkable and brilliant observations of the symptoms of the first stage of this strange disease have been mostly corroborated by the patient's statements for the author's clinical data. His belief, based upon the best evidence which he has been able to collect from literature and patients, is that it is essentially an infectious disease of childhood, although the testimony and proofs are not sufficient to make this belief into a fact.

Myles considers nearly every case of bilateral, perennial, suppurative rhinitis in children as a possible atrophic case. He has commenced the treatment by removing whatever obstruction there might be to the breathing, and also by increasing the nasal drainage in any way that might seem expedient. Naturally, the little patients could not be expected to visit a specialist frequently throughout a series of years for an almost unnoticeable postnasal catarrh. Those whom he has seen from time to time and who have been fairly persistent in the home treatment, have so far failed to develop the fetid ozena type. He has been able to follow up only a very limited number of these mucopurulent cases. This would show that all cases of perennial suppurative rhinitis do not terminate, after treatment in atrophic rhinitis associated with ozena, but it does not prove that all cases of atrophic rhinitis are not preceded during childhood by perennial mucopurulent rhinitis.

In treating the first stage of the disease, Myles uses the alkaline solutions with the pipette and spray, such as Dobell's, Seiler's, or those of chloride or bicarbonate of sodium, which he finds more efficacious when used quite warm. A weak solution of hydrogen dioxide, 1 to 5 or 10 of water, instilled slowly into the nose, will aid in dislodging the mucus which may be fixed in the crevices and under the turbinals. After the nose has been cleansed according to instructions, the nurse or child is taught to use about one-half of a grain of powder which is composed

<sup>1</sup> Laryngoscope, June, 1908.

of 1 part of boric acid to 2 parts of aristol. This is insufflated into each nostril with the powder blower once a day, preferably before retiring. The morning treatment is the same with the alkaline and germicidal solutions and the peroxide, to be followed by the use of either of the following ointments: Ichthyol,  $\mathfrak{z}$ j to  $\mathfrak{z}$ ij; lanolin,  $\mathfrak{z}$ ij; vaselin alb., q. s. ad  $\mathfrak{z}$ j; or nosophen, gr. xxx; lanolin,  $\mathfrak{z}$ ij; vaselin alb., q. s. ad  $\mathfrak{z}$ j. After this, two or three times a day, an albolene spray with one grain each of eucalyptol, acid carbolic, and menthol, to the ounce, is used through an atomizer. The turbinals are reduced when they appear to obstruct the drainage from the accessory sinuses and the fossæ. The recesses are cleaned with the cotton applicators, alternately dipped in solutions of various astringents, antiseptics and germicides. A 25 to 50 per cent. solution of argyrol has been found to be the least irritating.

The treatment of the second stage consists of removal of the malodorous crusts, the prevention of their reformation, and operative procedures on the accessory sinuses. Myles has operated on the sphenoidal, ethmoidal, frontal, and maxillary sinuses in several cases during the second stage, and while decided reduction was noticed in the amount of the secretion and crusts, it was not commensurate with the relief secured in similar cases which were operated on during the third stage.

He states that in his experience proper operative treatment of the nasal accessory sinuses, in addition to the local treatment of the other stages, has given the best general results. When safe and feasible, large and permanent openings are made in the anterior sphenoidal cell walls, ethmoidal cell floors, and antranasal walls, in cases where the secretion flows chiefly from these cells.

In the third stage, when the atrophic changes are naturally on the decline, the objectionable features in many cases show signs of a spontaneous abatement, and it is in this stage that operations on the accessory sinuses have given the best results. Ozena has disappeared after thorough operations in all cases of syphilitic or suppurative necrosis of the bones, and in cases of putrid debris or degenerative conditions in the respective sinuses.

Myles closes by stating that his treatment has been directed against a disease which he believes to belong essentially to childhood. The later manifestations of arrest of development and atrophy are more or less the results of mechanical flooding of the parts by a peculiar tenacious secretion. The cause of the secretion, in his opinion, is an infection which only finds a suitable culture soil on the mucosa before the age of puberty.

George L. Richards<sup>1</sup> reviews the various forms of treatment which have been employed, and gives his own method of dealing with the individual case as follows: First, a careful history, endeavoring to find

<sup>1</sup> Laryngoscope, June, 1908.



out how long the disease has lasted, its probable etiology, its relation to the general health, and what therapeutic measures, if any, have been used. The nose and nasopharynx are then thoroughly cleansed by syringing through the nostril and through the nasopharynx a saline solution of which the well-known Seiler's tablet, or some modification thereof, is the base. A considerable amount of the solution is not infrequently required. With the nasal speculum and cotton pledgets the nose and nasopharynx are carefully cleaned of any remaining secretion and the condition of the mucous membrane ascertained. If there is the slightest reason for suspecting co-existent sinus disease, transillumination, puncture of the antrum and probing of the sphenoid and frontal are done. He has rarely found accessory sinus trouble to be co-existent. When it is, appropriate treatment for the condition is at once undertaken. The patient is then instructed as to the nature of the disease and impossibility of a complete cure, the possibility and probability of great improvement, and his own coöperation in the treatment requested. Some form of stimulating application is applied to the nasal and nasopharyngeal mucous membrane, preferably one containing ichthyol and iodine, or some of the milder silver solutions, as the strong applications do not produce as good results as the weaker ones. The patient is told to get a syringe, usually a three-ounce rubber one, instructed how to use it, and given a supply of alkaline tablets, two of which when dissolved in a glass of water will make a proper solution. With this solution the nose is to be syringed at home three times a day at first. Syrup of hydriodic acid and some form of tonic is given internally and the patient instructed to report for treatment three times a week, and certainly twice, until such time as he shall have returned with the nose free from crusts.

With such treatment the crusts become more moist and less tenacious, and in a short time the patient is much improved, but is not cured, and unless treatment be continued will soon relapse. Such cases are always told that unless they are willing to keep up the treatment for from six months to a year, faithfully keeping the nose clean much as they would brush their teeth, it is useless to begin treatment. From time to time variation is made in the local applications, the office treatment being continued until the patient returns free from crusts. In a few instances in young people, in whom Richards has been able to control the treatment for a sufficient length of time, an absolute cure has been produced. In one case in particular, a girl aged fourteen to sixteen years, who was under observation for several years, there was apparently a perfect cure, and the last time she was seen, some four years after the beginning of the treatment, and two and one-half years after entire cessation, the nose was apparently normal. Other cases, under observation for the same length of time, in which the conditions were fairly well controlled, would return to the original condition if treatment were omitted for any length of time.

H. Holbrook Curtis<sup>1</sup> has found cultures of *lactic acid bacilli* of especial benefit in the treatment of the early stages of atrophic rhinitis. In these cases the crusts liquefy and the nose presents an entirely different appearance after two or three applications. It is too early to state that there has been an actual cure in any of these cases, but the evidence has been so strong that it would seem to point to ultimate good results. He states that there is no topical application which approaches in any manner the efficacy of the lactobacilli culture in the treatment of mucopurulent secretion from the nose.

UNILATERAL OZENA AND SUBCUTANEOUS RESECTION OF THE SEPTUM. According to Mermod,<sup>2</sup> unilateral ozena does not occur when the nasal fossæ are of equal caliber. It is invariably associated with deviation of the septum, and the wider fossa is the seat of the malady. In a typical case of the kind one finds the narrower fossa in a state of catarrhal rhinitis, the result of mechanical obstruction, while on the wider side there are crusts, fetor, and dryness, the inferior turbinated body is atrophied, and the middle one either hypertrophied or the reverse. Difficulty in breathing is experienced equally on both sides, in the one case arising from encroachment of the septum and catarrh, and in the other from crusting and dryness.

In dealing with these cases, Mermod has obtained the most satisfactory results from submucous resection; it is necessary to avoid a perforation, which is not difficult, for in the cases in question the septal mucosa is never so atrophied as that of the turbinated bodies. Details of 4 cases instancing the success of the operation are given. In all the catarrh on the narrowed side was cured, whilst the crusting, discharge, fetor, and dryness on the atrophic side ceased, the mucosa became more or less moist, and lavages could be dispensed with.

**Septal Hematoma and Abscess.** While septal hematoma and abscess are among the unusual occurrences in rhinological practice, they can hardly be considered rare. Under this designation James E. Newcomb<sup>3</sup> describes three clinical conditions, namely, hematoma, abscess, and perichondritis, which is sometimes cystic. He objects to the term perichondritis, because the perichondrium is not alone involved, but all the septal layers participate in the process and sometimes the adjoining bone.

The most frequent cause of either variety of lesion is trauma, in the form of a blow or fall on the nose. A front blow seems more likely to set up inflammation leading to abscess than does a side blow, probably because such a front blow is more likely to separate the two united septal plates, thus permitting the accumulation of blood which offers a favorable culture medium for the growth of invading microorganisms. In

<sup>1</sup> Medical Record, July 11, 1908.

<sup>2</sup> Annales des Mal. de l'Oreille, du Larynx, du Nez et du Pharynx, August, 1908.

<sup>3</sup> Medical Record, March 14, 1908.



many instances it is difficult to establish the relationship between a trauma and the abscess, for slight contusions easily forgotten may lead to hematoma and later to abscess. The latter may occur in connection with or as a sequel to typhoid fever, influenza, sinus disease, larvæ in the nose, tuberculosis, syphilis, dental cysts and caries, anthrax, glanders, measles, variola, and typhus fever. It has been noted after vestibulitis, furuncles, and acute and chronic coryza.

In children it is more frequent during the first dentition, and is doubtless more common in those of the scrofulous and rachitic diatheses. It has followed too forcible tamponing of the nose. Lederman has reported one case occurring after the removal of a bony spur with the saw. Erysipelas often finds its point of entrance on this septal site. It may lead to local abscess. Dantziger states that in women the effects of a trauma are more apt to cause abscess if such trauma is inflicted during the menstrual period. Hecht declares that acute cases of perichondritis always follow influenza or aural trouble. Slow cases imply an infection of the nose on the area of least resistance. This author believes that hematoma without apparent cause is a characteristic feature of *influenza*, relating the histories of two cases tending to support this view. The first case was that of a boy, aged eight years, who contracted influenza from his mother. He presented the usual intranasal swelling, which proved to be a hematoma. The second case was that of a woman who developed influenza during her menstrual period, in which the characteristic swelling appeared as a hematoma, but subsided without suppurating. This hemorrhagic tendency of influenza is manifest in the brain, ears, accessory sinuses, and, in fact, on the mucous surfaces generally.

An unusual clinical history is that given by Herck, who relates that he was consulted by a woman of middle life, who had had, eight days before, a very long bicycle ride in the hot sun, and whose face still bore evidences of such exposure. On the day after the latter she had begun to have burning and discomfort in the nose, and when seen by Herck presented the usual symptoms of abscess. Incision gave vent to serous pus, and examination revealed partial destruction of the cartilage. Herck referred the lesion to the exposure to the sun, but it seems more probable that it was due to the continuous impact for a long journey on a dusty road of dust-laden air containing infecting microorganisms.

The features of the cases referable to dental abnormalities are illustrated by a case of Killian's. A young man had pain in his left upper incisor tooth, and two days later, nasal obstruction, frontal pain, and high fever. On the seventh day there was a spontaneous discharge of pus from the left naris. The entire mucosa was swollen on both sides and elevated from the cartilage. The evidences of sepsis with the escape of pus from the naris continued. Free incision revealed the fact that nearly the entire septum had disintegrated. The bony septum was not involved. Healing resulted in fourteen days. The tooth re-

ferred to appeared sound externally. The patient went along without incident for six months, when pain reappeared in the same tooth. It was extracted, but pus flowed from the socket and a probe could be passed 2.5 cm. to the floor of the nose and the septal cartilage. A cyst was found at the tooth root. Its wall was removed and the cavity scraped. The cyst had evidently broken through under the septal mucosa in the initial attack. Killian states that he knows of two other similar cases. In one of Roe's cases, the abscess followed the filling of a tooth with amalgam.

When we consider the frequency of trauma in this region, it is rather difficult to understand why these particular lesions are not more common. Some have supposed that the bacteriological effect of the nasal mucus inhibits the activity of the pus cocci in this region. The natural drainage is of course free. We know that while vascular parts bleed freely, this very vascularity enables them to recover themselves, so to speak, more freely. As above noted, the severity of the trauma seems to be of less import than its direction in the matter of abscess formation.

In hematoma the blood effuses under the perichondrium. This may subside or become infected and break down. The fluid takes on a brownish-yellow appearance, resembling neither pus nor blood. This is the condition designated by some writers as "cold abscess." If the case is non-traumatic and runs an acute course, it has been called "acute perichondritis." Another form, in which the fluid becomes distinctly serous, has been termed a "serous cyst." The fluid may be purulent from the beginning. Casselberry observes that "some sort of abscess is the culminating stage of all these conditions."

Why is the abscess bilateral, an incision on one side not always evacuating the other side? It must be remembered that the cartilage here is really a fusion of two plates which have become separated by the trauma and the inflammation to which it gives rise. The effusion of blood raises the perichondrium on each side. Moreover, the fused plates may become fractured, thus offering communication from one side to the other. The tissues may degenerate, and the effused pus often contains bits of grumous material. Probably in most instances the cartilage undergoes carious changes, but generally the mucoperichondrium is sufficiently preserved to make good this loss. Large sloughing is unusual, as is also invasion of bone, though Killian reports one case, that of a young man, aged twenty-one years, with the usual swelling of the nose and also of the hard palate. Incision of the former gave exit to clean, creamy pus; of the latter, to a few drops of foul, watery fluid. At this time no perforation could be detected. One was discovered, however, eight days later, and after another similar period the patient spat out two bony sequestra, leaving a small communication between the mouth and right naris. No trace of constitutional syphilis was discovered in the patient.



In the treatment of hematoma, the usual cold applications may be made over the nose and its interior kept clean. If the contents seem fluid they may be aspirated and firm bilateral pressure made by some form of tube or tampon, preferably the former. Serous cysts should be freely incised and their cavities scraped.

In case of abscess, the sooner and the more freely the incision is made, the less liability to destruction of cartilage and deformity. At times it is extremely difficult to keep up proper drainage, as strips of gauze or tubes inserted through the incision will not remain in place. A knotted loop of horsehair may be thrust through the incision, or a seton may be employed. The abscess cavity should be thoroughly flushed with hydrogen peroxide solution, followed by some alkaline antiseptic, but it should never be packed. In some instances, where the pus re-accumulates, Newcomb opens the cavity with the galvano-cautery. In case of unilateral abscess, it is of value to tampon the mucosa against the opposite side, rubber protective being placed in contact with the mucosa, and the cavity is thus obliterated by pressure.

**Nasal Obstruction and Irregularities of the Teeth and Palate.** During the past year considerable attention has been directed to the relation of nasal obstruction to irregularities of the teeth and palate, both by the rhinologist and the orthodontist. S. MacCuen Smith,<sup>1</sup> in a paper read before the Academy of Stomatology, Philadelphia, says that the influence of nasal and nasopharyngeal obstruction upon the development of the teeth and palate is of the greatest importance both to the stomatologist and the rhinologist. Nasal obstruction may be caused by a number of conditions, such as enlargement of the turbinated bones, irregularities of the septum, either deviation or exostosis, foreign bodies, tumors, congenital stenosis of the nares, as well as inflammatory conditions or newgrowths outside of the nose, causing interference with breathing.

The most common cause of nasopharyngeal obstruction in children is enlargement of the pharyngeal tonsil or adenoid vegetations. It may likewise be produced by large faucial tonsils, inflammatory conditions, newgrowths, and even too great prominence of the cervical vertebra. The effects of nasal and nasopharyngeal obstruction upon the development of the child, when they occur during the period of growth, are very marked and widespread. The clinical symptoms of adenoid vegetations, or, in fact, any nasal or postnasal obstruction, are well known: the characteristic facial expression, caused by the loss of the labio-nasal fold; the protruding upper lip with open mouth, receding chin, broadening of the bridge of the nose, alteration in the tone of the voice, impaired hearing, mental hebetude and aprosexia, nasal discharge, child snoring at night, complaints of headache and of being tired, with frequent attacks of irritability, peevishness, and bad temper. Later

<sup>1</sup> Dental Brief, August, 1908.

will be found the high-arched palate, with irregularity of the teeth and deformity of the chest, known as "chicken-breasted," accompanied by the characteristic vacuity of expression and dropping of the jaw. The effects on the general system are usually well-marked, the child being poorly nourished, anemic, and showing all the signs of suboxidation.

Ziem has demonstrated that nasal obstruction has a marked influence upon the development of the skull in young animals, one of whose nostrils he completely closed for a long time. There was seen deviation of the intermaxillary bone and sagittal suture toward the closed side; also lesser length of the nasal bone, of the frontal bone, and of the horizontal plate of the palate bone, and less steep elevation of the alveolar processes; smaller distance between the anterior surface of the bone, auditory capsule, and the alveolar process, also between the zygomatic arch and the supra-orbital border; also smaller size and asymmetrical position of the vascular and nerve channels on the closed side of the nose. The distance of the two orbits from the median line was unequal, which, as has been observed in man, leads to asthenopia, astigmatism, and strabismus.

Korner has pointed out that two varieties of deformity of the maxilla are found dependent upon the presence of adenoid vegetations before and after the second dentition. When nasal respiration is obstructed in a growing child before the second dentition, the palate assumes a higher elevation in time, and appears in section dome-shaped instead of slightly curved. The alveolar process forms an ellipse instead of a semicircle, and the lateral portions are approximated, the whole growth of the maxilla is retarded, but the milk teeth are in their normal position. After the second dentition, however, if the adenoids have not been previously removed, the maxilla undergoes much more pronounced changes. The alveolar processes become still more approximated, the palate more elevated, even resembling a Gothic arch; the anterior part of the alveolar process becomes inclined forward, the lateral halves form an angle at their median junction, and the jaw assumes the V-shaped form so well known. These changes necessitate alterations in the position of the teeth, the median incisors are turned so that their lingual surfaces look toward each other. If the growth has been much retarded by prolonged obstruction, the teeth are crowded out of their normal places. The lateral incisors, and frequently the bicuspid as well, are pushed inward, while the molars turn outward. Since the lower maxilla develops at the normal rate, it frequently happens that the outer edges of the upper bicuspid strike against the inner one of the bicuspid of the inferior maxilla. In consequence of the elongation of the anteroposterior axis and the oblique position of the incisors, it frequently happens that the incisors do not approximate.

Mouth breathers are also subjected to pyorrheal conditions from the fact that the mouth is continually open, thereby removing the pressure



afforded by proper occlusion of the teeth, which is so essential to a healthy condition of the dental organs. In some cases mouth breathing persists, even after free nasal breathing space has been obtained by the removal of the adenoids or enlarged tonsils. This is more particularly true in cases where nasal obstruction has existed for a long time, and the changes resulting therefrom have become more or less permanent. The force of habit may also have something to do with it, as the moment these patients take their mind off themselves they cease to breathe through the nose and open the mouth. Attention should first be directed to the removal of the nasal or postnasal obstruction, whether it be due to enlarged tonsils, adenoids, or any other obstructive condition, before any attempt is made to correct the deformity of the teeth. After free nasal respiration has been reëstablished, the patient should be referred to the orthodontist for the correction of the dental irregularities.

Whitehead has compiled the following theories to explain the direct method by which the nasal obstruction brings about these changes: One is based on the interference which nasal obstruction exerts upon the development of the nose. The hard palate in the fetus lies above the level of the Eustachian tubes; at birth it is on the same plane, and later considerably lower. This is due to downward growth of the hard palate, so that one factor in the production of a highly arched palate is a lack of development of the alæ of the nose, and more especially of the sphenoid and the septum, while the alveoli and the rest of the face develop at the ordinary rate. This descent of the hard palate is made still more evident when it is remembered that in the infant the posterior nares are almost round, while in the adult they measure twice as much in the vertical diameter as in the horizontal. Any factor which interferes with the development of the child and of the nasal cavities will retard the proper development of the hard palate and its consequent descent.

Another explanation is that of the lateral pressure which the cheeks, aided by the weight of the lower jaw, exert against the nostril when the mouth is kept open. Some authors regard this as the chief agent in the production of the changes in the upper jaw, and their theory is as follows: The position of the tongue is altered in the habitual mouth breather. Normally, when the mouth is closed the tongue lies against the teeth, the palate, and the alveolar processes, but when the mouth is open the tongue lies in the lower maxilla, and there is no pressure against the upper maxilla. Before dentition the unopposed lateral pressure of the teeth produces a narrowing and lengthening of the alveolar process, and during both periods of dentition, especially during the second, the processes are still more closely approximated, the maxilla becomes more elongated, the descent of the palate is still further retarded, and the resultant changes in the position of the teeth follow, whereas the lower maxilla develops in the ordinary manner and remains practically normal. The

loss of the milk teeth and the greater vascularity of the maxilla during the period of growth of the permanent teeth are regarded by some as the causes of softening of the maxilla, which explains the marked character of these changes during the second dentition

Mayo Collier believes that the air stream passing through the mouth and past the nasopharyngeal space produces a negative pressure in the nose, and therefore a positive upward pressure on the lower surface of the hard palate.

It would appear that each one of these theories is partially correct, but that no single one would be sufficient in itself to produce all of these or to wholly explain the production of these deformities. However, there is no doubt that interference with nasal respiration often produces serious and extensive deformity of the teeth and jaws, and that restoration of nasal breathing will prevent this deformity of the maxilla if seen early, and that at any stage it can be considerably alleviated.

W. Sohier Bryant<sup>1</sup> considers the nose as the axis on which the facial development depends, and that any pathological variation of this part produces trouble elsewhere. Most of the evils thus produced are traceable to mouth breathing due to nasal obstruction. Many evils, in his opinion, are traceable to this cause; besides oral infection and its consequences, we have imperfect development of the maxillary bones, dental irregularities, and deficient development of the nose, sinuses and all parts of the face. Any one of these factors may be primary, but the nose is usually first to blame. It is of extreme importance, therefore, to insure nasal breathing from the earliest infancy before habit is formed or structural changes are produced. If the obstruction is acute, as from catarrhal conditions, the prognosis is good; if chronic mandatory mouth breathing exists, the prognosis is good if surgical or orthodontal measures are resorted to soon enough, but after the twenty-fifth year it depends on the extent of the arrest of development. The sooner the defect is remedied the more simple and effective the treatment. "The importance of nasal breathing is manifold: it is a safeguard against infection, an aid to proper physical and mental activity, through a sufficient supply of oxygen, a requisite of moral strength, esthetic outlines, and a protection to the faculties of hearing, speech, and smell." The course of treatment to pursue if nasal breathing can be maintained, is to straighten the teeth first and operate on the nose later, if necessary. If it cannot be maintained, operate on the air passages sufficiently to allow nasal breathing before regulating the teeth. Then regulate the teeth, and, last of all, do what final work is required on the nose.

F. A. Faught<sup>2</sup> presents the subject from the orthodontist's standpoint, and draws the following conclusions: (1) The etiology of the general subject of dental irregularity, and particularly the interrelation of such

<sup>1</sup> Journal of the American Medical Association, January 25, 1908.

<sup>2</sup> Ibid., January 18, 1908



deformity and chronic respiratory disturbances is still lacking a definite basis. This matter should receive particular attention at the hands of every orthodontist. (2) Dental irregularity in the vast majority of instances is associated with, if not dependent on, upper respiratory obstruction. (3) Dental practitioners, and particularly orthodontists, should be more familiar with the common forms of upper respiratory obstruction, their symptoms, diagnosis, and treatment. (4) The comparative study of the changes brought about through corrective procedures, should be more carefully studied, and more accurate methods of measuring and recording them devised. (5) The rational treatment of dental irregularity should include preliminary examination and treatment of the nasal chambers and pharynx. (6) The result of the ordinary expansion operation on nasal conditions is more dependent on vital tissue in the nasal region than on mere mechanical movement. (7) Operations designed mechanically to increase the respiratory capacity of the nasal passages are practically valueless unless the intermaxillary suture is separated, as shown by increase of space between the central incisors. (8) It is impossible to relieve stenosis due to adenoids or septal irregularities by expansion methods. (9) Adenoids and deviations of the septum should receive the usual treatment at the hands of the rhinologist prior to the correction of dental irregularity. (10) The stimulation of vital forces and renewed growth in the nasal chambers, together with the restoration of normal conditions in contiguous parts, are the chief causes of improvement following the expansion operation.

**Epithelioma of the Nasal Cavity** is rarely seen, but when it does occur it is usually primary and shows a tendency to invade the surrounding structures. Guisez presented a patient before the Parisian Society of Laryngology, Otology, and Rhinology<sup>1</sup> upon whom he had operated for epithelioma which filled the whole left nasal fossa; the tumor, inserted on the inner wall of the nasal fossa, was visible on simply raising the nostril. The patient had neither complained of pain nor epiphora. She had consulted him simply for stiffness and obstruction. Operation was carried out according to Faure-Moure's method, which consists of resection of the nasal bone and ascending process of the superior maxilla. There was no recurrence three months after operation.

Castex operated two months previously on an exactly analogous case, except that the disease was situated on the right side. The subject was a woman, aged forty years, whose right nasal fossa was obstructed by a growth which the histological examination demonstrated to be cylindrical epithelioma. An incision was made over the inner half of the eyebrow and continued along the outer border of the nose; the ala nasi was detached and the whole of the nasal bone removed. According to Moure's method the tumor was removed with a curette; there was no recurrence, and the nose was not deformed.

<sup>1</sup> Journal of Laryngology, Rhinology, and Otology, October, 1908

**Surgical Treatment of Rhinophyma.** Gersuny recently operated successfully in a case of this nature, and the operation is thus described by the Vienna correspondent of the *Lancet*. The procedure was done under local anesthesia produced by a solution of cocaine of 1 per cent. strength, only a few grains of the alkaloid being used. The tumors were incised near their border, so that the underlying cartilage was exposed. Then the skin was undermined all around, and the tumor removed, thus leaving a free narrow edge of true skin everywhere. This free edge was fixed to the wound by a few sutures. The saving of this free edge is important, as it serves as a margin for the tip and the edge of the nose. Then the remaining wound was covered by flaps of epidermis taken from the extirpated tumors. The dressing consists of gutta-percha tissue fixed to the skin by means of chloroform. The dressing can be removed after four or five days. The chief advantages of this method are: (1) The natural appearance of the nose is preserved after the operation, because there is no difference in color between the new skin and the surrounding parts of the face; and (2) the removal of the large masses tends to improve the vascular condition in the face, so that the often concomitant acne rosacea disappears or is much diminished. Seven patients have hitherto been operated upon by this method with very good results.

**Reduction of Enlarged Turbinates.** A submucous operation for the reduction of enlarged turbinates is described by C. P. Linhart.<sup>1</sup> The operation is intended particularly for those cases of simple intumescence, with vasomotor paresis of the walls of the bloodvessels composing the erectile tissue, when the turbinal has become flabby from repeated attacks of rhinitis. The details of the procedure are as follows: The nose is made as aseptic as possible by some suitable alkaline wash, such as Seiler's solution. The mucous membrane for three-eighths of an inch over the site of the proposed submucous incision is thoroughly cocainized across the long axis of the turbinal. For this purpose a pledget of cotton soaked in a 2 per cent. solution of cocaine is applied. This is allowed to remain for five minutes, after which a 20 per cent. solution of cocaine is rubbed into the turbinal with a cotton-tipped probe three or four times, at intervals of two minutes, or until the parts are thoroughly anesthetized. Before making the incision, the site of the proposed operation is again gently bathed with an alkaline solution by means of a tuft of cotton on an applicator.

A perpendicular cut one-fourth inch in length is made through the mucous membrane, just anterior to the hypertrophied portion of the turbinal. A slender dissector is then introduced and passed straight back close to the periosteum, in the long axis of the bone to its posterior extremity. On account of the uneven surface of the outer border of the

<sup>1</sup> *Laryngoscope*, February, 1908.



turbinate bones, particularly of the inferior, it is often necessary to use considerable force and some manipulation of the handle of the instrument up and down and from side to side, so that the point of the dissector may pass over the little bony protuberances, in its passage back. In some cases where there is only slight intumescence, the scraping of the periosteum and gentle breaking down of some of the erectile tissue with the dissector will be sufficient. Where there is considerable distention of the venous sinuses it is necessary to cut through their walls and break them down in order that sufficient inflammatory action may produce the necessary adhesions for the desired shrinkage. For this purpose a hatchet-knife is introduced with the blade flat against the periosteum of the turbinal, back as far as it is desired to cut. The knife is then rotated so that the blade will reach out toward the greatest prominence of the flabby turbinal. If the redundant tissue is hanging down on the floor of the nose as well as projecting against the septum, it may be necessary to make a downward as well as inward cut. The knife is then turned out toward the bone and the periosteum torn from the rear to the front. The edge of the hatchet-knife faces the handle, and the knife is always drawn toward you when making a cut; this avoids the danger of making a puncture or tear, as could easily be done by a pushing movement. After withdrawal of the knife a tight-fitting nasal splint is introduced to hold the cut surfaces as tightly as possible against the torn periosteum. The splint is kept in place for forty-eight hours, after which time sufficient adhesions will have formed to bind the redundant tissue closer to the bone.

The advantages of this operation are: It shrinks the vascular tissue of the turbinals, allowing free respiration of air through the nose; cutting across the walls of the venous sinuses causes their obliteration, and permanent shrinkage results from the inflammatory adhesions; the base of the scar is on the turbinate bone, the seat of greatest traction; the operation being submucous there is less danger of troublesome hemorrhage and infection; there is no destruction of the mucous membrane, and consequently no open wound to heal by granulation; it requires but a short time for surgical treatment (two days), and causes least interference with the physiological function of the nose.

### THE ACCESSORY SINUSES.

**Antrum of Highmore.** Arthur S. Underwood<sup>1</sup> gives the results of his investigations on the *relations of the teeth to the antrum of Highmore*. One hundred and fifty skulls of all ages and both sexes were trans-illuminated, and the interior of the sinus explored with fine wires. In

<sup>1</sup> Journal of Laryngology, Rhinology, and Otology, London, November, 1908.

addition to this, thirty-three skulls were obtained which had been sawed through below the orbit, exposing the floor of the antra and that of the inferior meatus. He thinks that the size and position of the sinus is modified, and perhaps altogether governed, by eruption, development, and subsequent loss of the teeth to an extent not hitherto suspected. In all cases the cavity extended well behind the last of the standing back teeth. Where all the cheek teeth were in position the cavity extended about one-half to one-quarter inch behind the third molar, which tooth is invariably in relation to its floor; the second and first molars were almost always in relation to the cavity, the second premolar generally and the first premolar fairly often, the canine rarely.

In normal cases the floor of the cavity was about one-half inch deeper than the floor of the inferior meatus, and the deepest part was between the roots of the second molar tooth, the palatine roots lying embedded in the palatine wall and the labial roots in the labial wall of the sinus. The floor sloped slightly upward in front and behind. During eruption of the molar the floor of the sinus was raised in a bony dome over the crypt; this dome was absorbed and became a concave basin after eruption. After eruption the roots of the premolars are often visible as bony eminences on the floor, and in some cases molar roots also. They rarely penetrate the bone.

Where all the teeth in relation to the antrum had been lost, the floor of the sinus rose to the level or even above that of the meatus. Where a few had been lost, the elevation of the floor was confined to that area. Thus, in a case where one side only was edentulous, that antrum was shallow and small, the other side being normal.

In 19 out of the 33 sawed maxillæ there were septa vertically rising about one-quarter to one-half inch above the floor, and dividing the deep part of the sinus into two or more compartments; 14 of these cases were on the left side and 5 on the right. The septa were between the teeth, shutting off, as it were, the part above the tooth, generally between the second and third molars.

The left sinus was markedly smaller than the right in 8 cases. The right never smaller than the left. There were only 3 cases with undoubted signs of long-standing chronic abscess over the roots of cheek teeth, but in these cases, instead of the antrum being opened by the abscess, bone had been heaped up over the abscess sac, so that the floor of the sinus was very thick and raised far above the level of the meatus floor, and the whole cavity reduced to about one-fifth of its normal capacity. In acute cases, of course, this would not happen, and long-standing untreated cases were fortunately rare. From these researches Underwood draws the following conclusions:

“1. *The Effect of the Septa.* These septa, which appear to be very frequently present, divide the floor of the sinus into a series of pockets. Very commonly one of these pockets, which in shape resembles a pudding-



basin, exists posterior to the last or third molar roots, in size about a quarter of an inch in diameter and depth. No amount of lavage would with any certainty clear this cavity, and a residuum of fluid would always remain undrainable by any suggested method of drainage with which I am acquainted. Another very common septum divides the region occupied by the third molar from those teeth in front of it. This septum is often half an inch in height. This would create a difficulty in any attempt at lavage through any opening in front of the third molar roots. A third very common pocket is formed by a small septum between the second premolar and the first molar. There is also quite frequently a small septum creating a separate bony pocket in the anterior quarter-inch of the sinus. These septa may easily explain recurrences of septic symptoms after apparently complete lavage, after operation by the Caldwell-Luc and other methods.

“2. *The Canine Fossa is Often in Front of the Sinus.* In about 70 per cent. of a fairly extended series of skulls taken from the post-mortem theatre and the dissecting room, the canine fossa was either quite in front of the anterior limits of the cavity or only just accessible to it.

“3. *Relation of the Roots of Teeth to the Sinus.* The third molar, if existing, is always in relation to the cavity. The second molar is normally always in relation to the most dependent part of the floor of the cavity. In the case of healthy molars the roots are in the *walls*, not the *floor* of the cavity, and the floor descends in cup-like form between the palatine and buccal roots.

“4. *Chronic disease of the roots of teeth* tends to thicken the floor of the sinus and renders the cavity *less*, not *more* accessible through the alveolar opening.

“5. *The early loss of cheek teeth* raises the floor of and diminishes the capacity of the sinus.

“6. These conditions can be diagnosticated during life by a surgeon who has been a careful student of the dental aspect of the case. That is, he can with tolerable accuracy pronounce (a) the capacity of a given antrum; (b) the state of its floor as regards level and to a limited extent the presence of septa, from an examination of the mouth in the living patient. It appears to me that such information must prove valuable to the operating surgeon in assisting him to form a more exact forecast of the dimensions and general conditions of the cavity on which he proposes to operate.”

In a discussion on antral disease before the British Medical Association, Herbert Tilley<sup>1</sup> summarizes as follows: (1) The alveolar route is especially suitable for acute empyemata of dental origin; that it will cure a certain number of chronic cases due to the same cause, and the likelihood of success is greater the earlier the method is adopted. The

<sup>1</sup> British Medical Journal, August 22, 1908.

method is not suited for cases of intranasal origin. A solid plug will be more suitable than a hollow one. (2) Intranasal drainage by one or other route is a more satisfactory method for dealing with chronic antral abscess; (a) because free drainage into the nose is established and this is continuous and permanent, and it involves no trouble to the patient beyond irrigation with some mild aseptic for a few weeks after the operation. Contamination from the mouth is also prevented, and the sacrifice of a useful, though possibly not a sound, tooth will not be called for. (b) From the patient's point of view there are no painful after-dressings, and neuralgic pain, so frequent after alveolar puncture (so that the patient often dreads the use of the syringe), is almost unknown with the more radical procedures. (c) Convalescence from the more radical Caldwell-Luc operation is rapid; the patient is rarely detained indoors beyond five to seven days. The simple intranasal operation is often done in the out-patient department of the hospitals, and the patient goes home a few hours later.

With regard to the treatment of *chronic antral empyemata* by means of *vaccines*, or by treatment based upon the opsonic index, Tilley has not had a large experience, and the few patients who were thus treated did not give satisfactory results, although the treatment was carried out by experts. It seemed that their chief difficulty lay in the fact that a variety of organisms were present in each case. Apart from acute cases of obviously dental origin where alveolar drainage may be adopted with every hope of success, he makes a plea for the more frequent adoption of the intranasal drainage, a method which has more advantages than, and none of the drawbacks of, the alveolar method, while its employment is in complete accord with those general principles of surgery which should guide us whenever we endeavor to cure chronic suppuration of a bony-walled cavity.

Vail<sup>1</sup> describes and illustrates an original method of opening the antrum of Highmore intranasally. The technique of the operation is as follows: Having sterilized the patient's nose, lips, and nasal vestibule with soap and water, bichloride solution, and douched the nasal cavity in front and rear by postnasal douche, the hairs of the nasal fossa are cut short and pledgets of cotton soaked in 5 per cent. cocaine are packed under, upon, and above the inferior turbinated bone. These are allowed to remain seven minutes, during which time a special aseptic glass syringe is properly sterilized and loaded with equal parts of 2 per cent. cocaine and 1 to 2000 adnephrin. This will reduce the cocaine to 1 per cent. solution and the adnephrin to 1 to 4000. The cotton is withdrawn from the nose and the operative field brushed with 1 to 5000 adnephrin solution, then the needle of the hypodermic is inserted under the mucous membrane of the turbinal in the site of the operation, which is not the

<sup>1</sup> Laryngoscope, January, 1908.



front end, but the middle third of the turbinate. The solution is driven under the mucous membrane on the lateral wall beneath the inferior turbinate, as well as on the convexity of it. In all about 20 drops are injected.

As soon as the needle is withdrawn the actual operation begins. A special perforator is passed in the nose point downward toward the floor. When the middle of the inferior turbinal is reached, it is turned directly toward the antrum and thrust through the bony partition under the inferior turbinate by a positive pressure, at the same time forcing the handle of the instrument toward the septal side. When the antrum is entered, the instrument is forced backward toward the pharynx and forward toward the nasal entrance to enlarge it in order to insure entrance for the saw, which is next used. The special grooved antral saw is inserted well through the slit, with the teeth toward the antrum cavity. The tip of the nose is deflected toward the other side by the nasal speculum to permit inspection and a free sweep. The saw is grasped firmly, the patient's head steadied by an assistant, and a few bold strokes of the saw, keeping in mind the intent of making an oval opening and causing the saw blade to describe the oval in its course, which it naturally does, coming out where it first started, will render the maneuver successful, even in the cases of narrow nares. There is usually an overhanging apron of mucous membrane, which the saw, in its oblique course through the posterior half of the oval, has undercut. This is easily cut away by angular scissors or Gruenwald's forceps. The cavity is now open for exploration with the large probe of Krause. A little aristol powder insufflated will aid the vision in locating the opening. The cavity should be washed out with sterile salt solution and packed with a moist gauze strip, and the operation is completed. The patient is ordered to wear a cotton plug in the nostril for three or four days to guard against outside infection.

The advantages claimed for this method are the painless operation under local anesthesia; the lessening of personal risk to the patient; the speedy execution of the entire operation (the usual time being ten minutes); the operation is completed without the necessity of a preliminary turbinectomy, and the cure resulting without the wearing of plugs and plumbing devices.

**The Frontal Sinus.** J. C. Beck<sup>1</sup> describes and illustrates a method of opening the frontal sinus by first determining its limits by a skiagram, making a tracing of the same on celluloid, applying this tracing to the exposed bone surface and cutting the osteoplastic flap on its lines. The celluloid tracing can be sterilized in bichloride of mercury and alcohol for use in the operation. The bone flap, after division of the periosteum, is cut through with a chisel, except at the base over the supra-orbital

<sup>1</sup> Journal of the American Medical Association, August 8, 1908.

borders and root of the nose, where the periosteum is left intact. There the bone is carefully divided with a Gigli saw from the inside after the bone flap cut away above has been slightly pried out, great care being taken not to injure the periosteum. After eradication of diseased mucous membrane (without curetting) and the anterior ethmoid cells, and enlarging the natural opening, a wick drain in a rubber tube is passed down into the nose, the bone flap replaced, and the skin flap closed. The advantages claimed for the method are the ascertaining of the exact limits of the sinus before cutting the bone flap, and the prevention of the flap falling in by the securing of a firm hinge at the base, and its natural upper marginal bevel, where the anterior and posterior tables join. The operation, he says, is not a radical, but a conservative one, and if it fails, the radical operation of taking away the bony flap can be done under local anesthesia. The gauze he removes the day after operating, and the rubber tube is replaced the third to the fifth day by a silver filagree or gold tube.

**The "Vicious Circle" of the Nose.** Ballenger<sup>1</sup> calls attention to the fact that the obstructive lesion which interferes with the ventilation and drainage of the frontal, anterior ethmoidal, and maxillary sinuses is usually not located in the sinuses, or even in their ostia, but is in the hiatus semilunaris and infundibulum, or in the structures in their immediate vicinity. It is a well-known fact that any cavity lined with mucous membrane is predisposed to infection and inflammation when its drainage and ventilation are impaired, and, therefore, any anatomical or pathological condition which causes obstruction to the flow of the secretions from the infundibulum, via the hiatus semilunaris, will predispose the mucous membrane lining the sinuses draining into it, to infection and inflammation. It is obvious that if the obstruction to the drainage and ventilation is removed, the predisposition to infection and inflammation will disappear.

This obstruction may be produced by the following conditions: (a) The nasal septum is frequently deviated toward the lateral wall of the nose in the region of the anterior half of the middle turbinated body, often crowding the middle turbinal against the outer wall of the nose, thus obstructing the drainage and ventilation of the frontal, anterior ethmoidal, and maxillary sinuses. (b) The middle turbinated body is frequently enlarged by edema, hyperplasia, or by the presence of accessory ethmoidal cells in its body, and may in consequence block the hiatus semilunaris; or the middle turbinal may cling so closely to the outer wall of the nose as to block the hiatus. (c) The bulla ethmoidalis is located immediately above the hiatus, and when enlarged it may overhang and completely obstruct it. (d) The lip of the uncinate process, or median wall of the infundibulum, may be the seat of accessory pneu-

<sup>1</sup> Laryngoscope, March, 1908.



matic cells which may obstruct the infundibulum. These anatomical structures Ballenger calls the "vicious circle of the nose."

He believes that a very large majority of the cases of inflammation of the frontal and anterior ethmoidal sinuses may be cured by limiting the treatment to this area. Of the cases curable by limiting the treatment to the "vicious circle" of the nose, many are curable by non-surgical methods, such as local applications of adrenalin, cocaine, a 10 per cent. glycerin solution of ichthyol, antipyrine, etc. Still others may be greatly benefited by divulsing the middle turbinal away from the septum, or away from the outer wall of the nose, according to its point of impediment or obstruction. In the remaining cases it will be necessary either to remove the anterior half of the middle turbinal, or break down the enlarged and overhanging bulla ethmoidalis, or even to exenterate the anterior ethmoidal cells as thoroughly as possible, and in rare instances to remove the floor of the frontal sinus by Halle's method. In those cases complicated by inflammation of the posterior ethmoidal and sphenoidal sinuses the surgical treatment should be extended to include them in its scope.

**Vaccine Treatment of Sinus Disease.** Joseph C. Beck<sup>1</sup> reports several cases of sinus suppuration treated by this method, in all of which, previously to the vaccination treatment (autogenous), the usual accepted method of treatment had been employed without beneficial results. All of the cases were subjected to the opsonic index, which was lower than the normal; one as low as 0.3 and the nearest to the normal was 0.76. In all but one of the cases, and that was one of chronic bilateral sinus infection, in which more than one index was taken, he depended almost exclusively on the clinical manifestations as an index and used the average time of ten days between the times of vaccination. Complete records were kept on the observations, such as reaction and other symptoms, and Beck states that without exception there was a distinct improvement, and some of the cases were cured, although sufficient time has not elapsed in the chronic cases to be absolutely certain.

So far as complications or accidents are concerned in this treatment, in not one case was there a single bad result, and only one that caused any anxiety, and that was as follows: In the case of subacute unilateral sinus disease of *Staphylococcus pyogenes aureus* infection, at the second injection into his left arm there followed what clinically one would diagnosticate as an erysipelas, with marked infiltration from the point of inoculation above the elbow down to the finger tip, but absolutely no general symptoms. The patient felt as well as he ever did, and there was no infection of the axillary glands.

Most of the cases showed slight general disturbances for from an hour to four hours after the vaccination, such as nausea, malaise, and

<sup>1</sup> Laryngoscope, May, 1908.

slight headache, and occasionally a slight rise of temperature. The dose employed was usually 1 c.c. of the vaccine, representing 300,000,000 staphylococci, other organisms requiring a strength of from 50,000,000 up. If the patient reacts badly and becomes depressed after the injection, he recommends a prolongation of the interval between the administrations.

ADMINISTRATION AND DOSE OF STAPHYLOCOCCUS VACCINE. Bruce C. Kelly<sup>1</sup> believes that the dose of staphylococcus vaccine commonly employed, namely 100,000,000 to 500,000,000 staphylococci, is often too large, and therefore harmful. He records a case of chronic fronto-ethmoidal suppuration of many years' duration, which has been under treatment with a vaccine for eighteen months. The patient was operated upon for antral suppuration eighteen months previously, with entirely satisfactory results. This operation was followed by a very acute exacerbation of the frontal sinusitis, which was treated by daily irrigation of the sinus for a month. Much improvement resulted, but a large amount of purulent discharge continued. Staphylococcus in pure culture was found in pus drawn from the frontal sinus and a vaccine made. The first hypodermic injection of vaccine was given on April 7, 1907, and between this date and October 21, 1907, the patient had sixteen injections, varying in dosage between 500,000,000 and 100,000,000 staphylococci. Many of these injections were controlled by opsonic index determinations made both before and after injection. It was always found that the opsonic index corresponded closely with the clinical signs, enabling one after a time to dispense with the determination altogether. Frontal sinusitis, in most patients, at all events, is a condition in which determinations may be safely dispensed with. In this case a low index means frontal headache and increase in the amount of discharge, and vice versa. After each of the above injections there was a negative phase marked by pain, increase in the amount of purulent discharge, feeling of illness, and sometimes enlarged cervical glands, lasting four or five days when the larger doses, for example 500,000,000 of cocci, and two or three days when smaller amounts, for example 100,000,000, had been given.

At the end of October, 1907, the patient was much better, both locally and generally, than she had been for more than a year, and there was great improvement in the general septic condition in which the patient had been some months previously. The discharge was much less, the pain, except during the negative phase produced by the menstrual periods, quite infrequent. The patient remained well until February, 1908; during that time no further injections were given. Then the sinusitis again became active and remained so, with periods of less activity until April, when, as there were no signs of improvement, vaccine treatment was resumed. The dose of vaccine was much reduced, so as to

<sup>1</sup> British Medical Journal, October 17, 1908.



abolish the troublesome negative phase, and was given about once a week.

Further, following Latham, the vaccine was given by the mouth, on an empty stomach, in normal saline solution. The same clinical effects were produced as when the hypodermic method was employed, for example, 60,000,000 staphylococci by the mouth gave the patient slight frontal headache for about a day and a half, with increase of discharge lasting a day or two longer; while if this amount was given hypodermically, the negative phase lasted decidedly longer. Doubtless the positive phase lasts longer after hypodermic injection than after oral administration. The doses were further reduced to 20,000,000, and sometimes 10,000,000, staphylococci by the mouth, and these smaller doses were found to cause no subsequent headache, though there is always slightly more discharge for one day, the second or third after administration of the 20,000,000 cocci doses of vaccine. Since April this patient has been steadily treated with the vaccine in doses of 10,000,000 to 20,000,000; sometimes there was an interval of a week, and sometimes only four days between the doses. During this period she has been in better health in every way than she has been for several years past. She has rarely had any frontal pain, except during a menstrual period, and at times days have elapsed without any purulent discharge.

Kelly thinks it is difficult to resist the conclusion that the improvement is due to the vaccine, and, further, that small doses, that is, 10,000,000 or 20,000,000 of cocci, have answered best, and, moreover, that oral has been as efficient as hypodermic administration, and entails less time and trouble. While a cure in such a case seems to be too much to hope for, any method of treatment which might obviate the necessity for a radical operation is worth attempting. Further, though the improvement has been slow, it has been marked, and still continues, accompanied by a continuous levelling-up of the patient's general health and lessening of the general septic condition which existed before treatment by vaccine was commenced.

**Intracranial Complications of Nasal Origin.** C. G. Coakley<sup>1</sup> states that intracranial complications arising from rhinological lesions are very rare. There are three paths by which it is possible for infection to reach the brain from the nose and accessory sinuses, viz., by the bloodvessels, by the lymphatics, and by direct necrosis of the bony walls. Out of 200 cases he has observed but 3 in which the posterior walls of the frontal sinus were involved. The inferior wall, however, not infrequently suffers considerable bony destruction. In the ethmoidal cells there are three types of disorders, viz., suppuration, polyp formation, and cysts. One reason that the literature on the subject is so meagre is because cases of painless sinus infection are not, as a rule, regarded either by the laity

<sup>1</sup> Medical Record, June 13, 1908.

or by physicians as in any way as serious as a similar lesion occurring in the ear. Furthermore, the nasal cavities communicate with that portion of the encephalon which lays in the interior fossa of the skull. Not so with the ear, which communicates with the middle and posterior fossæ. It is well known how much damage can be done to the interior portions of the brain without symptoms and also how little can be done to the middle and posterior portions without serious symptoms at once arising. As to operative technique, he prefers the so-called ethmoidal route, which enables one to work parallel to the floor of the cranium, as it seems much safer than the maxillary route. The operation in acute cases should permit of absolutely no delay.

**Foul Breath.** An interesting article on this subject is contributed by Andrew Wylie,<sup>1</sup> of London, in which he tabulates the various causes of breath fetor. The types of fetor are classified as: (1) The putrefactive type; (2) the sulphuretted hydrogen type; (3) the garlic type; (4) the sweetish type; and (5) the toxic or hepatic type. He further classifies the condition according to the different regions responsible for its source, summarizing them thus: (1) Diseases of the nose and its accessory cavities, causing nasal obstruction and mouth breathing; (2) imperfect deglutition; (3) oral and lingual affections; (4) diseases of the teeth and gums; (5) diseases of the tonsils; (6) chronic suppuration of the middle ear; (7) affections of the nasopharynx; (8) diseases of the lung; (9) foreign bodies in the mouth, nose, pharynx, or larynx; (10) constitutional causes.

Some diseases of the nose cause a specially pronounced odor, for example, rhinitis sicca, which arises when the secretion is impaired or diminished in quantity and quality. A similar condition is found in atrophic rhinitis, where actual structural degeneration of the mucous membrane has taken place. Thus, in caseous rhinitis, where the pus and debris are charged with various forms of moulds, yeasts, and putrefactive bacteria, such as *Aspergilli torulæ* and the *Bacillus butyricus*, and in chronic diseases of the accessory cavities, where pus is lodged in the maxillary antrum, or the ethmoidal, frontal, or sphenoidal sinuses, also in tertiary syphilis with necrosis of the ethmoid or vomer. In septal perforations, whether from operations, from tuberculosis, or syphilis, there is also fetor, and the same is found when polypi and sinusitis co-exist. Generally speaking, fetor may be present in any malformation of the nose which interferes with free discharge and proper ventilation.

Speaking of the constitutional causes, he mentions: (1) Gastro-intestinal derangements and dyspepsia, especially those which are associated with dilatation of the stomach. In patients troubled with severe chronic constipation there is a peculiar sickly, almost fecal, odor from the breath. Spirit drinkers have quite a different odor from beer

<sup>1</sup> West London Medical Journal, April, 1908, vol. xiii, No. 2.



drinkers; the former is of a vinegar type, while the latter have the characteristic smell of stale malt liquor. The breath of cigar and pipe smokers has a different smell, according to the favorite form of using tobacco. (2) Different varieties of glycosuria cause a sweetish odor to the breath. (3) Menstruation always causes some change in the breath; in some individuals it is so pronounced that they can hardly mix with society during that period. (4) During lactation also in some patients there is a marked odor from the breath. (5) Drugs have a great influence on the breath, and it is one of the signs to watch for in their administration. Lead and mercury produce a well-known effect on the gums, and in extreme cases much fetor. All preparations of sulphur cause a characteristic sulphuretted hydrogen smell of the breath. Copaiba and valerian have a cat-meat smell, iodoform a rancid smell, and belladonna and opium diminish secretion and cause a dryness of the mucous membrane, to which bacterial activity may be superadded. (6) Occupations have also a great deal to answer for as regards foul breath. Milkmen, or those continually working in milk, have a peculiar odor owing to constant contact with the *Bacillus butyricus*. The reason of this is probably the direct transference of the bacillus by the fingers to the nose with consequent rhinitis. The same theory applies to workers among skins and furs, who have a distinct animal odor. Those who work with phosphorus, lead, or brass have a peculiar metallic odor from their breath, which is associated with rhinitis and "spongy" gums. (7) Many nervous diseases cause an odor from the breath, such as is found in paralysis and apoplexy. The foul breath which frequently follows a hemiplegic attack is doubtless quite familiar. Mental dulness and physical disability prevent proper cleansing of the lips, teeth, and tongue; thus sordes accumulate and fetor is produced.

In dealing with the treatment of these conditions, Wylie points out that successful treatment of fetid breath depends, first, upon a clear recognition of the cause; secondly, on the persistent and thorough employment of the methods adopted; and thirdly, on the intelligent coöperation of the patient.

Remedies to overcome fetor must not be taken in hand in a half-hearted manner; they must be persevered with most thoroughly, and the patient should be instructed in every detail of the technique, whether this includes a douche, spray, or insufflation. A mere temporizing by the use of "deodorizers" only results in disappointment if the source of the odor remains untouched.

The chief aim in overcoming foul breath is to treat and remove the immediate cause, which is usually bacterial in origin, whether primary or secondary. With the object of clearing away fetid accumulations in the nose and nasopharynx, "solvent" douches must be employed. It is useless merely to employ antiseptics which do not possess the power of dissolving mucin, albumin, and the constituents of crusts. The best

ordinary solvent is sodium sulphate (1 per cent. solution) or sodium baborate or carbonate (in 0.5 per cent. solution). The nose should be thoroughly douched with this until the passage is free from crusts and caseous matter. Antiseptics can be employed afterward direct to the membrane by means of sprays. In mild cases, when the fetor is not severe, and when the mucous membrane is still sensitive, the olfactory function not being destroyed, an atomizer of liquid paraffin containing menthol, oil of cinnamon, or eucalyptus is preferable, but if the fetor is very intense, Dobell's alkaline solution of phenol may be sparingly used.

Healthy secretion is restored by gentle stimulation. This can be done in mild cases by using a snuff composed of boric acid with attar of roses, but when the disease is very atrophic and secretion scanty, 5 per cent. of lysoform should be added as a powerful stimulant and antiseptic. Sea water, boiled and decanted, forms an excellent douche, especially when combined with a visit to the sea air. The nasal and pharyngeal mucous membranes, except in cases of atrophic rhinitis, are very sensitive, and will not tolerate antiseptic solutions of anything like the strength and intensity which the mouth does. Densely hard crusts are painlessly removed by inhalations of steam, camphor being added to the hot water as a stimulant. To facilitate oral hygiene, solutions of lysoform (1 per cent.), sanitas, peroxide of hydrogen, etc., are most beneficial; permanganate of zinc (1 in 500) or zinc chloride (0.5 per cent.) is recommended in cases of "spongy gums."

**The Use of Lactic Acid Bacilli Cultures in the Nose.** The positive results obtained from the use of the lactic acid bacilli in the digestive tract, after the Metchnikoff method, led H. Holbrook Curtis<sup>1</sup> to experiment with cultures of Massol's bacillus in the respiratory passages. While it was with a certain amount of skepticism that these experiments were begun, the good results in certain cases have been so marked that the conclusion seems warranted that a very valuable advance has been made in the treatment of pathogenic conditions of the nose and the accessory cavities by the use of the lactic acid secreting bacilli.

In the test cases the secretion from the nasal fossae were examined before the bacilli were introduced, and again after successive applications of the culture. In some cases after a limited number of injections not only have the pyogenic bacteria been destroyed, but there has been found a total absence of all bacteria in the secretions. Injections by means of a catheter into a profusely discharging frontal sinus have caused a diminution of the discharge, amounting to 90 per cent., after the second dose of a cubic centimeter of the culture; and this in a case of over a year's duration. In several instances of chronic ethmoiditis with profuse postnasal discharge, the condition has been so relieved that the patient has asserted himself entirely cured.

<sup>1</sup> Medical Record, July 11, 1908.



Should future experimentation substantiate the evidence of results obtained thus far, it would seem that a new era in the treatment of pathogenic bone cavities has been instituted—and that the theories of Metchnikoff admit of a much wider application than he has claimed. The method of application is as follows: In the nasal cavity a cubic centimeter of the culture broth is sprayed under pressure on either side of the middle turbinate, in order to reach the anterior and posterior cell orifices, the theory being that the bacilli will find their way into the ethmoid cells and the accessory cavities, and by their secretion destroy the pyogenic bacilli which are causing the disease. A sterilized narrow test-tube into which has been poured 1 c.c. of the culture admits a sterile Sass spray tube and makes the application of the medium by compressed air pressure very convenient. In the sphenoid, frontal, and maxillary sinuses the culture may be syringed through the metal catheters appropriate to the locality. The application is made every second or third day.

Curtis says it is too early to state what improvement, if any, may be expected from this treatment in cases where there exists necrosis of the bone; where the disease is confined to a pus-secreting membrane in the accessory cavities it promises most excellent results.

### THE PHARYNX.

**Anomalous Folds in the Nasopharynx.** Two unusual cases are described by J. Payson Clark,<sup>1</sup> in which smooth folds were attached to the Eustachian prominences and draped up like portieres to the vault of the pharynx. One patient came under observation for enlarged tonsils and adenoids, and these were removed. He was also deaf, and the operation was followed by marked improvement in the hearing, but the folds were left undisturbed. In a second similar case, occurring in a young adult, a small piece of the folds was punched out and examined microscopically, but revealed only the structure of normal pharyngeal mucosa. The folds were situated between the auditory tube and the fossa of Rosenmüller, and were consequently in the position of the arch which lies between the first two gill clefts of the embryo (counting the spiracular cleft first). In the cases presented the folds may be only adventitious developments of mucous membrane.

**Local Treatment of Acute Inflammations of the Throat.** Goodale<sup>2</sup> has made a number of careful clinical examinations before, during, and after treatment of acute inflammations of the throat, to see what the effect of treatment would be, local antiseptics and silver salts being

<sup>1</sup> Boston Medical and Surgical Journal, April 2, 1908.

<sup>2</sup> Ibid., June 25, 1908.

used. As a result of his observation he comes to the following conclusions:

1. In a beginning tonsillitis antiseptic applications may perhaps be used with benefit, and their effect, if any, will be to abort the local infection. If the disease is not checked at the outset by the sterilization of the parts, and proceeds to the formation of white spots in the crypts, with systemic involvement, further application of antiseptics may not only be useless, but harmful.

It would appear possible that antiseptics may retard convalescence in two ways: First, by diminishing the number of bacteria in the crypts which are generating toxin and consequently prolonging the period required for the formation of the requisite amount of antibodies; second, by their destructive action upon the tissue cells and phagocytic leukocytes of the host.

2. Forceful application of antiseptics may be followed by increased fever and cervical adenitis, indicating heightened absorption of toxin into the system. The phenomenon may be compared to the depression which follows the injection of too large a dose of vaccine in cases undergoing opsonic treatment.

3. In certain cases where acute tonsillitis appears to be aborted by local antiseptics, inflammatory manifestations may follow after a day or two in the neighboring regions and last for a number of days or several weeks. Here the possibility is suggested that the checking of the tonsillitis checked also the establishment of the immunity, and that for its final accomplishment a longer period of growth of the organism upon the membranes of the nose, larynx, trachea, or bronchi was necessary.

Goodale remarks: "If the conclusions to which I have come prove, on fuller investigation, definitely established, we shall have to modify our time-honored treatment of these affections. If I may venture to prophesy, our procedure will be approximately as follows: Active early local treatment, as at present, with guaiacum, silver preparations, etc., the avoidance of antiseptics when once the disease is definitely under way, and, above all, complete local and general rest. It may be said with truth that the most vigorous and active measure that we can adopt in acute infections of the throat is a consignment of the patient to his bed, with avoidance of meddling interference."

**Diagnostic Value of Symptoms of the Upper Respiratory Tract in General Disease.** A symposium under this title was presented before the New York Academy of Medicine, April 2, 1908. Thomas J. Harris<sup>1</sup> discussed the subject from the standpoint of *nervous diseases*, and said that affections of the nervous system presented symptoms of value and importance from a diagnostic standpoint in the throat and nose, whether they were true organic affections or only functional disorders, such as the so-called

<sup>1</sup> Laryngoscope, June, 1908, p. 472.



neuroses. Of the two, the organic affections were the more important, and showed themselves chiefly in the larynx, and were in the form of either sensory or motor disturbances. The motor manifestations represented either an excess or diminution of action. Excess of action was seen in spasms which might be tonic or clonic. Tonic spasms might take the form of spasms of the larynx, or laryngeal crises, or icterus laryngis; clonic spasms might take the form of spasms, as twitchings or tremors. When an organic nerve lesion was present it was most frequently one of diminished action or paralysis. These paralyzes might involve the superior or inferior laryngeal nerve. A paralysis of the former was rare, while a paralysis of the inferior laryngeal nerve almost without exception involved the crico-arytenoideus posticus at the onset, and only at a late stage, if ever, attacked the adductors. This was a striking fact, and its clinical significance was at once apparent. A posticus paralysis had to do with respiration.

After a review of the present-day opinions on the innervation of the larynx, Harris considered how they might be utilized in a practical manner in diagnosis. This applied chiefly to affections of the medulla, and below, although it was true that cerebral hemorrhage, tumors, abscess, gummata and pseudobulbar palsy might produce motor changes in the larynx when extensive enough or properly situated. *Tabes dorsalis* at times shows symptoms in the nose, such as disturbances of the olfactory nerve, resulting in anosmia or parosmia, but usually they were limited to the larynx in some form of paralysis. Unilateral or bilateral posticus paralysis might be regarded as characteristic of tabes. In the bilateral form the one symptom was gradually increasing inspiratory dyspnea, with expiration unaffected. Even more interesting were the various forms of laryngeal motor irritations in tabes. These included ataxia of the cords, giving rise to the characteristic scanning speech.

*Laryngeal crises* might occur early in the disease, like the palsies, and might even precede the ocular manifestations. The laryngeal crisis was characterized by the simultaneous involvement of all the respiratory muscles, and so differed from an ordinary spasm of the larynx with the cords immobile in the median line and their free borders taut; this would mean, in all probability, a central nerve lesion. If the picture should change in time to one showing the cords in the so-called cadaveric position, *i. e.*, midway between inspiration and expiration, with concave borders, they would know that the entire recurrent nerve had been involved, pointing to the progressive character of the lesion in the bulb. Sensory disturbances in connection with tabes are rare.

*Multiple sclerosis* of the brain and spinal cord may produce symptoms in the larynx almost if not quite as frequently as tabes. The common symptom present was a delay in the muscular action. This might take the form of tremor in phonation, and an abnormal tendency to voice fatigue. There is to be noted also the scanning speech, with

frequent interruptions by high-pitched, explosive sounds. The voice is often raspy and hoarse. Occasionally there is met true paralysis, usually of the adductors.

*Syringomyelia* produces laryngeal symptoms, also motor in nature, and reduced reflex irritability of the posterior pharyngeal wall.

*Progressive bulbar paralysis* is especially characterized by symptoms referable to the tongue, lips, and larynx. The laryngeal symptoms do not appear with any such constancy as do the symptoms referable to the tongue.

*Progressive muscular atrophy* very commonly manifests symptoms in the larynx or pharynx, and these were usually of the nature of paralysis, either of the entire throat and larynx, or more often of the larynx.

*Neuroses.* The functional nervous affections often show themselves in the upper air passages, and the two most commonly met with are paralysis agitans and hysteria. Paralysis agitans in a considerable number of cases give rise to laryngeal symptoms, and usually of a motor character. In hysteria, nose and throat symptoms are frequently met with, and these might be either sensory or motor. Sensation was often affected.

Anesthesia of the mucous membrane of the nose and pharynx is frequent. The septum is wont to escape, as well as the larynx. Hyperesthesia and analgesia of the pharynx is quite frequent, and takes the form of a choking sensation, feeling of a foreign body, and the familiar globus hystericus. Disturbances of coördination during phonation are common. Dysphonia spastica is the term used to describe the spastic form here.

After considering a few other conditions which gave symptoms in the upper air passages, Harris concluded that two things have been shown, viz.: (1) That pharyngolaryngeal symptoms in nervous diseases were deserving of more attention on the part of the neurologist than they had received up to the present time; (2) that no field offered greater opportunity to the laryngologist for original study and research than that which embraced the innervation of the larynx.

Francis H. Bosworth,<sup>1</sup> in considering the subject of *syphilis* of the upper air passages, states that the diagnosis is based largely upon ocular inspection. When it invades the mucous membrane of the upper air tract, in the majority of cases it pursues a regular and orthodox course, and avoids the eccentricities and idiosyncrasies which characterize its invasion in other portions of the economy. The mucous patch is the result of a deposit of the inflammatory corpuscles in the epithelial layer of the mucous membrane, causing appearances with which all are familiar, occurring five or six weeks after the primary sore, or being delayed often for months, and, in rare instances, characterizing the history of the disease.

<sup>1</sup> Laryngoscope, June, 1908, p. 474.



The second lesion is the superficial ulcer, in which the inflammatory corpuscles are deposited not only in the epithelial layer, but also in the mucosa, probably giving rise to a coagulation necrosis, which very rapidly breaks down, the resulting ulcer involving the epithelium and the mucosa of the membrane. This presents the typical and characteristic appearance of the shallow, ovoid ulcer, with necrotic tissues, a purulent secretion, and a very limited areola.

The third manifestation is the gumma, in which the deposit is not only in the epithelium and mucosa, but in the submucous tissues beneath, such as the periosteum, or whatever tissues may underlie the mucous membrane. This breaks down more or less rapidly as the result of the coagulation necrosis; the narrowing of the bloodvessels causes a breaking down into the so-called deep ulcer, or tertiary ulcer, with its ragged, crater-like border, deep-seated, dark-colored areola, profuse discharge of pus, and necrotic tissue. The nasal cavity is the home of the gumma, but, curiously enough, it is rarely observed, owing to the fact that the necrosis and deep ulcer follow so rapidly that they do not come under observation. But three cases are recalled by Bosworth, in a somewhat large experience. In the vast majority of cases the first recognition of the disease here is a necrosis of the vomer, or, in rare instances, of the turbinate bones, with the characteristic symptoms of fetid odor, filthy green crusts, and the presence of necrosis detected by means of the probe. Necrosis of the nasal bones is almost pathognomonic of syphilis.

Many entertain the view that syphilis of the nose or other portions of the air tract is a progressive disease. Bosworth thinks that this is to be questioned. According to his view, it is rather an explosive disease. The poison lurks in the system for months, gathering strength, virulence, and activity, without manifesting itself in any form, until, finally, it suddenly invades one of the tissues of the body, depositing these round corpuscles. Having accomplished this, the outbreak becomes for the time being a local disease, the gumma in the nose breaks down into deep ulcers, which involve the whole mucous membrane, as well as the periosteum, etc.

The larynx is a favorable point for the study of syphilis, but the diagnosis is oftentimes very difficult. The laryngeal symptoms are not easily assigned to the various forms which it assumes—the primary sore, erythema, mucous patch, superficial and deep ulcers. In the majority of the cases we apparently have to do in the larynx with what may be called “laryngitis deformans,” an irregular, diffuse thickening of the mucous membrane, as the result of a small ulceration, with cicatricial sequelæ, which seriously impairs the function of the larynx, but which presents appearances that are often puzzling. Furthermore, we often have cases in which the main reliance in confirming the diagnosis lies on the amenability to the specific treatment. Very often this fails to aid us.

When we come to the consideration of faucial syphilis—the manifestations in the lower pharynx, faucial pillars, tonsils, palate, and uvula, we come to the consideration of the region which is the most favorable of all portions of the economy for the study of syphilis, and where it is readily recognizable. It runs a regular course, manifests no eccentricities, and develops no deceptive appearances. From a clinical point of view it is a rather curious feature of syphilis that it manifests a marked tendency not to transcend anatomical boundaries. Syphilis of the nose very rarely extends to the skin in front or into the pharynx behind; syphilis of the lower palate very rarely extends beyond the border of the soft palate above or the larynx below; while syphilis of the larynx, even more than cancer, shows a disposition to remain a laryngeal outbreak.

Bosworth, in concluding, emphasized the following points: (1) The larynx, beyond all other regions of the body, is a favorable site for the study of syphilitic outbreaks, and the one in which less than other regions they are liable to be mistaken. (2) The hesitancy of syphilitic outbreaks to transcend anatomical borders. (3) The fact that an outbreak of syphilis is self-limited and shows no tendency to extend. In other words, the explosive theory of syphilis is one that is well worthy of consideration.

*Rheumatism, Gout, and Diabetes.* Emil Mayer,<sup>1</sup> who presented this phase of the subject, says the first and most important relation of the upper air tract in rheumatism is the etiological factor. It is now generally accepted that rheumatism is a disease of the infectious type, and that some form of streptococcus is responsible, and there is practically unanimity also that entrance into the system is obtained by way of the mouth through some part of the Waldeyer ring. The manner of entry is graphically described. The bacteria of health find themselves strongly entrenched in the tonsillar tissue of the ring, faucial, pharyngeal, or lingual.

Mayer characterizes the mouth as the “club-house” for all sorts of disease germs seeking admission. Here is the forkway of food and air, and here, too, are the crypts in the tonsillar tissue where the enemy may become lodged. The health germs fight valiantly to throw off the septic ones, and succeed usually, unless reinforcements arrive for the enemy, and somewhere a denuding of the epithelium takes place, when a portal of entry is found, the lymph spaces are entered, then the glands and infection ensues. Regarding the precise point of infection there is a difference of opinion, and Mayer quotes extensively from the literature on infection through the tonsils, giving both the affirmative evidence and opposing views. He further states that rheumatism once established may show itself in the nose, pharynx, and larynx, and distinct rheumatic

<sup>1</sup> Laryngoscope, August, 1908, p. 610.



affection of the crico-arytenoid articulation has been shown to exist. Laryngologists have frequently made the diagnosis of rheumatic affection of the upper air passages, then only eliciting a history of rheumatism, and with appropriate treatment cured the patient.

Practically all that has been said regarding rheumatism applies equally to the condition known as gout, with the exception that in the latter there is frequently a concurrent condition in the nose of a vasomotor type. Many of the nasal symptoms subside when treated in the same manner as gout, and these have been variously labelled as due to the lithemic or gouty diatheses.

Of the relation of the upper air passages to *diabetes*, one of four cases cited by Leichtenstern is briefly quoted as follows: A singer, female, of tall, stately figure, not overstout, complained that her voice was gradually failing. At first she noticed it only in responding to encores, but of late it affected her so that she felt herself unable to continue her vocation. Her sensation was that of dryness, though she never had any inordinate sense of thirst, nor was there any emaciation. Except that her cords looked dry and shining, as though varnished, there was no abnormality to be seen. The urine showed a specific gravity of 1036, and sugar was found to amount to 70.4 grams in twenty-four hours. With rigid diet, the sugar disappeared, and there was a complete return of vocal power.

The condition is spoken of as *xerosis*, and occurs in but a small percentage of diabetics, and is an early symptom of the condition, the discovery of which thus early being of great advantage to the patient. Diabetic furunculosis of the larynx occurs among the later manifestations, but is also rare, Mayer having seen it twice in 412 cases of diabetes. He never saw a perichondritis follow this condition, though it may occur. While diabetics are prone to furunculosis, due to the entrance of pyogenic staphylococci, the laryngeal mucous membrane withstands these, and it requires a special vulnerability to permit their entrance. Any acute laryngitis may, however, prove a fertile spot for their entrance, and hence diabetics should avoid a laryngitis. Phlegmonous circumscribed laryngitis comes suddenly; there is a sharply circumscribed inflammatory process, followed by serous exudate; the edema is followed by abscess in a few days.

Mayer concludes "that infection in rheumatism and gout enters the system by way of the mouth, the opinion of the majority being that the chief point of entrance is the tonsil; that rheumatism may affect as such the nose, pharynx, and larynx; that gout affects the larynx, but most frequently the nasal mucosa; that diabetes may be discovered very early by painstaking examinations in certain laryngeal cases, a late symptom being furunculosis of the larynx and possible perichondritis, and that fatal ulcerations in the throat occasionally manifest themselves in diabetes."

**Necrotic or Ulceroperforative Angina in Scarlatina.** Felix Langlais<sup>1</sup> describes a form of severe angina in scarlatina that consists of ulceration of the pillars, palate, uvula, etc., ending in perforation, and generally fatal. This form is very contagious, and should be carefully isolated from its inception. The ulceration appears at the time of the exanthem as a white patch, which does not consist of exudation, but leaves a raw surface when a portion is removed with forceps. It extends in depth but not in extent after it has formed. The necrosis may go on to the bone of the palatal vault, and in some cases there is ulceration of the gums and necrosis of the jaw at the site of the incisor teeth, which drop out. The lips and tongue may also participate in the ulcerative process. There is present a very marked infection, with high fever, pain in the throat, inability to swallow or take nourishment, much albumin in the urine, dry skin, and diarrhea. The breath has an infected odor, and a sanious discharge runs from the mouth. The submaxillary glands are much swollen. Death results soon from intoxication and failure to take nourishment.

### THE TONSILS.

H. A. Barnes<sup>2</sup> discusses the *anatomy of the crypts of the tonsil*, with their epithelium and the capsule. From these considerations he reaches the conclusion that any operation for pathological conditions of the crypts, and consequent toxic absorption from them, must have for its object their complete obliteration by the entire removal of the tonsil. With regard to the epithelium lining the tonsillar crypt, he is of the opinion that the cryptic epithelium of the tonsil of childhood, and of the hypertrophied tonsil of the adult, considered as a mechanical force, can offer no very great obstacle either to the invasion of bacteria or to the absorption of their products; other forces must be responsible for immunity to infection.

The quiescent tonsil of the adult, however, possesses an epithelium which in itself would seem to be fairly effective defence against bacterial invasion. The structure of the capsule, its toughness, and the ease with which it may be separated from the underlying tissue make the operation of dissection of the tonsil "in capsule" a very practical one. Blunt dissection is used principally, but a cutting edge or snare may be necessary to complete separation of the lower half. This operation is neater and more thorough than any other. Barnes prefers the snare for separating the more adherent part of the tonsil at the lower part for fear of hemorrhage.

<sup>1</sup> Journal de Médecine de Paris, June 12, 1908.

<sup>2</sup> Boston Medical and Surgical Journal, September 24, 1908.



**Adenoids and Tonsils.** H. G. Longworth<sup>1</sup> considers this subject from the standpoint of the general practitioner and with special reference to an examination of the throat in chronic systemic infections and a consideration of the question of status lymphaticus in these cases. The work of investigation in the matter of the tonsils as portals of infection is briefly reviewed. He does not believe that the question as to whether in a particular patient the throat is a point of entrance for joint infections can be truthfully answered. It is wise to thoroughly extirpate enlarged tonsils if they are present, and thus replace a structure of at least lessened resistance by a sound wall of tissue. Undoubtedly a tonsil which becomes infected on slight provocation constantly menaces the patient with lesions which range all the way from a lacunar tonsillitis to endocarditis and pulmonary tuberculosis. Adenoids are undoubtedly responsible for many of the febrile attacks in childhood. They may become suddenly inflamed, cause earaches from temporary closure of the Eustachian tubes, and are more common than is generally supposed.

**THE TONSIL FROM AN EVOLUTIONARY POINT OF VIEW.** Jonathan Wright<sup>2</sup> refers to the recent work of Brieger and Gorke, who regard the pharyngeal tonsil as an organ which protects childhood. They seem to find sufficient evidence to warrant them in the belief that in its hypertrophied condition it is a more efficient protection against the entrance of the unknown germs of the diseases of childhood than when it retains its normal dimensions.

The tonsil is a definite organ; it is the most highly developed of all the lymph glands. It is situated at the gateway of nourishment and disease; it is not only at the beginning of the hollow tubes of respiration and nutrition, but it is the first of the internal filters which lie across the paths traversed by the agents of infection. Change in the habits of man brought about by the forces of civilization may be supposed to increase the frequency of tonsillar enlargement, and it certainly increases the amount of bacteria-laden dust. The absorption of these from the pits on the surface of tonsils where drainage and inspiration have carried them, where they have lodged from passing food, is increased, and the inner organs of defence make a larger demand on the outer organs of defence for protection. The clue to a connection which may exist between the hypertrophy and the efficiency of the organ as a bacterial filter possibly may be found in the observation that the small submerged tonsil is a tonsil of infection, and the large discrete tonsil is the tonsil of health.

Wright does not wish positively to assert that the enlargements of the tonsils are always a protective physiological act of the organism. Neither does he wish to deny that they are frequently, or even usually, in ado-

<sup>1</sup> Boston Medical and Surgical Journal, January 30, 1908.

<sup>2</sup> New York Medical Journal, August 8, 1908.

lescence, a menace solely when diseased. Whatever may be the conclusions as to their marked enlargement, the knowledge derived from certain sources and the experimental evidence unite in pointing to the function of the tonsils as one of defence against infection.

**HYPERTROPHY OF THE PHARYNGEAL LYMPHOID TISSUE AND ITS RELATIONS WITH TUBERCULOSIS.** Nobecourt and Tixier<sup>1</sup> have investigated twenty-two children, the subjects of *adenoids* and hypertrophied tonsils, their ages ranging from thirty-one months to fourteen years. The faucial and pharyngeal tonsils were submitted to bacteriological and histological examination, and the children underwent the tuberculin tests (subcutaneous, skin, and ophthalmo-reaction).

Out of these children, thirteen had no clinical manifestations of *tuberculosis*; in six the signs were doubtful (peripheral polyadenopathy, mediastinal glandular enlargement, and apical bronchitis). In three only was tuberculosis unquestionable (two incipient tuberculosis of the apex, and one tuberculous cervical glands). Subcutaneous injection of tuberculin in a dose of 0.1 mg. was made in eighteen subjects. A positive result followed in seven instances, two of which were considered clinically tuberculous.

The skin reaction was applied in 18 cases; the result was positive in 12, especially so in the case of two known to be tuberculous and in two other suspects who had reacted to the subcutaneous injection of tuberculin.

The ophthalmo-reaction test was practised thirteen times; a positive result followed four times only, especially so in two admittedly tuberculous.

As a result of the tuberculin tests only five out of twenty-two children could be considered free from tubercle, yet the majority of them enjoyed good health. The tonsils were inoculated into guinea-pigs, but many of them died too rapidly to afford any information as to tuberculosis. In seven of the guinea-pigs, where an autopsy had been made at the correct period, no tuberculous lesion was found; amongst these were two which had been inoculated with tissue from tuberculous children. As regards inoculation with adenoid vegetations, in one case only was a pig tuberculized, and in this instance the vegetations belonged to a child not clinically tuberculous. The tonsils were histologically examined in sixteen cases and the adenoids in fifteen; no tuberculous focus was observed. Multiple sections were made from the vegetations which had tuberculized the guinea-pig, but revealed nothing. Preparations stained by Ziehl's method gave no indications of Koch's bacillus. Tuberculization had no doubt been determined by bacilli, existing either on the surface or deep in the pharyngeal mucosa, but which in any case had not had time to set up specific lesions there.

Nobecourt and Tixier conclude as a result of these researches that

<sup>1</sup> Gazette des Hôpitaux, September 22, 1908.



proof is wanting that the pharyngeal lymphoid tissue serves as a portal for bacillary infection. The observations, besides, go to show the existence of cervical and mediastinal non-tuberculous adenopathies among the subjects of adenoid vegetations and hypertrophied tonsils.

**The Tonsils and Their Relation to General Health.** Charles P. Sylvester,<sup>1</sup> after enumerating some of the anatomical changes produced by hypertrophy of the lymphoid ring, treats of a class of diseases originating through diseased lymphoid tissue of the nasopharynx, namely, those of bacterial origin. The most important is *acute rheumatic fever*. This disease too often follows tonsillitis to be a mere coincidence. According to St. Clair Thompson, from 30 to 80 per cent. of all attacks of this infection begin with tonsillitis. Another infection, the germ of which is probably closely allied to that of acute rheumatic fever, and found to begin in the tonsils (and probably only so), is *erythema nodosum*. Another important germ disease having its headquarters in one of the three tonsils is *tuberculosis*. Tuberculous meningitis has more than once been demonstrated to have had its birth in the pharyngeal tonsil, as also has tuberculosis of the middle ear. The severe and fatal cases of *acute streptococcus infection* beginning in the tonsils are not easily forgotten. *Staphylococcus* and *pneumococcus infections* from the tonsils begin also with extremely high temperature and rapid prostration. Fourteen cases of *phlegmonous appendicitis* associated with or preceded by acute tonsillitis, with postmortem findings in all, are reported by Professor Kretz. Deaths from *acute nephritis* in children following infection of the kidney from the tonsils have recently been reported. *Retropharyngeal abscess* is another form of bacterial invasion often secondary to diseased lymphoid tissue in the nasopharynx.

## THE LARYNX.

**An Original Method of Facilitating Intralaryngeal Operations.** Many devices have been introduced for the purpose of getting the epiglottis out of the way, and thus obtaining a good view of the interior of the larynx during intralaryngeal operations. Most of these have taken the form of some instrument which, when introduced into the glosso-epiglottic fossa or over the epiglottis itself, temporarily lifts up the epiglottis. Cyril Horsford<sup>2</sup> describes a method in which he passes a suture through the tip of the epiglottis, and brings the ends out over the tongue, holding them by means of clamp forceps. The weight of the forceps will pull the epiglottis forward against the root of the tongue and out of view. The patient holds the tongue in the ordinary way. Two

<sup>1</sup> Boston Medical and Surgical Journal, August 6, 1908.

<sup>2</sup> Lancet, July 11, 1908.

special forms of needle holders for passing the suture are figured. He sprays the pharynx, both surfaces of the soft palate, and the larynx with a 10 per cent. solution of cocaine. With a laryngeal syringe some of the solution is dropped on both surfaces of the epiglottis. A little adrenalin applied in the same way prevents hemorrhage. The swab or brush should not be employed, as it usually produces involuntary coughing, which is unnecessary and should be avoided. The histories of four cases of benign tumors removed from the larynx by this procedure are given.

**Treatment of Stuttering.** A simple and effective method of treatment for stuttering and stammering, the so-called "melody cure," has been devised by E. W. Scripture, of New York.<sup>1</sup> He recognizes the condition as one of "superenergetic phonation," or "hyperphonia."

The symptoms of superenergetic phonation may be classed as follows:

1. Cramps and hypertonicity of the breathing muscles. These may produce entire stoppage of the breath for a long time; the patient (and the hearer) must simply wait until the cramp passes off. In some cases the cramp lasts for twenty to thirty seconds.

These cramps may also produce short stoppages lasting a second or two, and thus breaking up the speech. They may also produce irregular and improper breathing. The patient may take in a breath and then be seized with a cramp that expels it before he begins to speak. Such cramps also upset the person's habits of breathing, so that he finally ceases to breathe in a way proper for speaking. Along with the cramps and also without them there often arises a continuous superenergetic innervation of the breathing muscles. The patient breathes as a child learns to write; he tenses his muscles far too much and produces awkward and fatiguing movements.

2. Cramps and hypertonicity of the laryngeal muscles. These sometimes go along with the breath cramps and shut the larynx up tight, so that no tone can be produced. More frequently we find hypertonicity of the laryngeal muscles, so that the flexibility of laryngeal action is lost. The vibrations of the vocal cords produce the tone of the voice, or the melody in which we sing or speak. In normal speech the melody is never constant; the voice is rising and falling at every instant. About nine-tenths of the stutterers, however, speak in a monotone; this is presumably due to the fact that it is easier to fix a group of tight muscles for one position than to keep them in easy action.

3. Cramps and hypertonicity of the muscles of pronunciation. The patients who forcibly contract these muscles for a moment or more are often called "convulsive stammerers." Those who have a series of cramps whereby they repeat a sound are usually termed "rerstsutte" or "reduplicative stutterers." There is no essential difference and no sharp dividing line between the two classes.

<sup>1</sup> Medical Record, March 21, 1908,



4. Accessory cramps, contortions, and tics. These may arise from the spreading of the cramp over the side of the face, over the entire face, or over the entire body, so that the patient jumps up and down.

The specific term for the disease would thus be "hyperphonia," and the three groups of symptoms would be called "respiratory, laryngeal, and articulatory cramps." The facial and bodily contortions might be termed "accessory spasms and tics."

Scripture's experience has convinced him that the disease is a pure psychomotor neurosis; it is a habit over which the patient has no control. It might properly be called a "mental tic," or the result of a compulsive idea connected with speaking.

Among the exciting causes we find irritations in the breathing organs (*e. g.*, adenoids), imitation of other stutterers, injuries to the breathing organs, fright, etc.

The general therapeutic indications naturally include treatment of any nose or throat trouble that may be present, building up the general health, etc. These procedures do not directly cure the stuttering (hyperphonia). It sometimes does occur that an operation for adenoids, for phimosis, or for anything else is followed by complete cure of the stuttering, but this is purely a result of the patient's belief that the operation was intended for his disease.

Every case of hyperphonia requires special therapeutic procedures. Scripture's experience has shown the following to be most effective: (1) Introducing melody into the voice. If the child is not very intelligent, first have him sing sentences to some familiar melody. He thus gets the idea that his voice must go up and down. Then he learns to speak sentences, sliding his voice likewise. But in most cases begin at once to teach the person to speak melodiously, using little verses and sliding the voice somewhat excessively. Then the patient is taught to say, "Good morning," "How do you do?" "Please give me a glass of water," etc., all with excessive melody. Finally, he is taught to speak and converse with melody.

This "melody cure" was stumbled on quite by chance while trying the various other cures, and it is as effective as it is simple. Fully half of the patients will absolutely cease to stutter as soon as they learn to speak melodiously. Scripture demonstrated the cure to a man of fifty who had stuttered frightfully since boyhood and had tried all cures in vain; it was merely intended to show him that it was possible to help him. In five minutes he ceased to stutter and went out of the office talking at ease. He never returned, but wrote that he did not stutter any more, and therefore did not need any treatment. Most people, however, require considerable practice before they can remember to speak melodiously, and the cure usually extends over periods ranging from four or five treatments to fifty.

The reason why this cure is so effective is that the stuttering habit

is associated with one definite manner of speaking. It is not carried over to a manner of expression that the person *feels* to be utterly different. A stutterer never stutters when he sings, because singing is to him something quite different. The melody cure gives the stutterer a new manner of speech unconnected with his compulsive idea. It is like a surgical operation that removes an old voice and gives him a new one.

2. Developing expressiveness. Most hyperphonics are stiff and awkward in their manner of expressing themselves, in their postures, in their gestures, their thoughts, etc. For these defects it is well to exercise them in talking with gestures, in declaiming emotional pieces, in giving offhand speeches on familiar topics, etc.

3. Distraction from the compulsive idea. Since hyperphonia is the result of a compulsive idea, it is necessary to get the mind off the idea during speech. The melody cure does this completely in many cases, but quite a number have difficulty in starting. To distract the mind at the moment of starting there are various effective procedures. The patient is taught to beat time in a vigorous, snappy way; when he wants to speak, he brings the first syllable out with a snap on the first beat. In a more difficult case he learns to say "One—two" beforehand, and bring the word out on the third beat.

Such a cure is often sufficient in itself. One little girl, aged twelve years, always repeated the initial sound of a sentence six times; she had no other difficulty. In two lessons she learned to beat time as she started to speak and had no more trouble.

These procedures will permanently cure three-quarters of the stutterers and stammerers if practice is given at first as often as possible and then at steadily increasing intervals. The treatment should last for fifteen minutes to half an hour. At first it should be given at least three times a week, then twice a week, then once a week, then once in two weeks, and so on. The patient should be warned that if he stops suddenly his trouble will probably return.

**Tracheotomy.** Since O'Dwyer introduced the operation of intubation, in 1887, this operation has, in many places, gradually superseded tracheotomy. W. Wolf,<sup>1</sup> at the instigation of Trendelenburg, has examined the question, as it applies to the patients of the University Surgical Clinic of Leipzig. He first discusses the literature of the subject, and attempts to show that, while some authors claim that the after-effects of intubation are satisfactory, the children who have this operation performed on them for diphtheria of the larynx not infrequently meet with further trouble later on.

Lehnerds has shown that out of 1539 cases, 16 suffered from ulceration due to the intubation tube. Trendelenburg has not allowed intubation

<sup>1</sup> Deut. med. Woch., April 23, 1908; Abstract in British Medical Journal, August 29, 1908.



to be carried out in his clinic, since he met with unsatisfactory results therefrom. During the last twelve years—that is, since 1895—404 children were tracheotomized for diphtheritic croup. The total number of children admitted for diphtheria during this period was 483. The primary mortality of the operated cases was 31.7 per cent., which he ascribes to the fact that so many were already moribund on admission.

During the same time the mortality of diphtheria intubation in the Children's Hospital in Leipzig-Reudnitz was 31.3 per cent., so that he feels justified in saying that the mortality of the two operations is equal; 264 children were discharged after tracheotomy. The details of 175 of these children's subsequent histories could be followed; 4 died, 1 of scarlatina and nephritis, 1 of pneumonia three weeks after discharge, 1 of a cardiac paralysis, and 1 of some unknown cause. He does not take these cases farther into account. There were 145 children who remained quite well, and had no symptoms which could be ascribed to the tracheotomy. A few of these children even grew up and took up singing as a profession; 24 showed symptoms, such as hoarseness, mild periodic dyspnea, etc., tuberculosis, and other conditions.

Wolf considers that his cases prove that Landouzy was wrong when he stated that the majority of children showed a special disposition toward *tuberculosis* after tracheotomy. Of the 4 cases of tuberculosis which he found among his old patients, he discovered tuberculosis in the families of three. Wolf claims that the after-histories of his patients fail to reveal any stenosing or damaging effect of tracheotomy. "The danger of the development of fibrous stenosis in the upper air passages is, according to the experience of our clinic, smaller after tracheotomy than it appears to be, according to the literature, after intubation." He has not met with a single case of stenosis after the operation which necessitated late operative treatment.

**Broncholithiasis.** Bronchial concretions are extremely rare, if we are to judge by the number of cases reported. I have seen only one case, which came under my observation in 1904, and which I reported at the time.<sup>1</sup> As a rule, the diagnosis is not made until the expulsion of one or more stones, although the use of the Röntgen rays and the bronchoscope will usually establish the diagnosis.

Bickel and Grunmach<sup>2</sup> report a very interesting case in which the patient, a woman, aged thirty-five years, coughed up at intervals concretions of considerable size, which apparently were formed in the large bronchi. Seven years before she had suffered with pleurisy and erysipelas. Since this time the cough had persisted, with occasional periods of remission. In 1902 and 1906 she had several hemoptyses. The paroxysms of cough occurred suddenly, were very severe, and, with or

<sup>1</sup> Laryngoscope, September, 1904.

<sup>2</sup> Berl. klin. Woch., January 6, 13, and 20, 1908.

without other sputum, sandy particles or concretions of varying size were brought up singly or several at a time. Such attacks occurred two or three times a year. The first one was six years ago. Examination of the chest showed evidences of a tuberculous process, although the sputum contained no tubercle bacilli. Examination with the Röntgen rays showed the presence of numerous large areas of calcification. The chemical analysis of the concretions, of which more than three dozen had been preserved by the patient, ranging in size from that of the head of a large pin to that of a pea, showed that they contained lime, mucin, bronchial epithelium, crystals, and leukocytes.





# OTOLOGY.

BY ARTHUR B. DUEL, M.D.

IN reviewing the literature of otology for the past year, one can hardly fail to be impressed with the thought that little new material has been added. Increased experience in operations, comparatively new to a large majority of aural surgeons, has filled the literature with recitals of results which are interesting, although scarcely as important as the later experience of those who were pioneers in this work in helping one to determine when to employ these measures.

**Suppurative Labyrinthitis.** Undoubtedly suppurative labyrinthitis has continued to occupy the foreground as an interesting problem. Unusual interest in this phase of otology was awakened in America by the visit of Jansen, of Berlin, who made it the subject of his paper before the American Laryngological, Rhinological, and Otological Society, at the fourteenth annual meeting, held at Pittsburg, Pa., May 28, 29, and 30, 1908. Although the title "Treatment of Infective Labyrinthitis after Fifteen Years' Experience," might suggest that it was a hackneyed subject, it, nevertheless, has been brought with force before the large mass of otologists, either here or abroad, only within the past two or three years. Having proposed the labyrinth operation more than fifteen years ago, and basing his observations on the experience of more than 100 cases, it was hardly necessary for Jansen to apologize for bringing the subject before the Society on the ground that "not many new or original facts can now be presented."

The symptoms characteristic of the acute stage of a suppurative labyrinthitis are four in number. Of these, three symptoms are of vestibular and one of cochlear origin. The vestibular symptoms are (a) nystagmus; (b) vertigo; (c) disturbances of equilibrium. The cochlear involvement would be announced by sudden and marked loss of hearing power.

The *nystagmus* characteristic of labyrinthine disease is rotary in character, is directed toward the sound side, and is increased when the eyes are rotated toward the sound ear.

With the nystagmus, the patient commonly experiences pronounced *vertigo*, the severity of which usually confines him to bed during this stage of the attack.

With the nystagmus and vertigo, *disturbed equilibrium* is nearly always a more or less prominent symptom, and at this stage the tendency is for the patient to fall toward the side of the diseased ear.



In addition to the above symptoms, Jansen lays stress upon headache and coated tongue as strongly characteristic of labyrinthine suppurations, although he notes that the latter symptoms are also commonly present in meningitis. As indicative of encroachment of the suppurative process upon the cochlea, we have sudden marked impairment or loss of hearing in the diseased ear. Naturally, this symptom often loses value from our ignorance of the patient's hearing power previous to the attack. The three symptoms first mentioned, viz. nystagmus, vertigo, and disturbed equilibrium, may gradually subside as the disease progresses from the acute into the latent or chronic stage, and may disappear altogether.

For the latent stage of suppurative labyrinthitis, the so-called caloric tests are most valuable. These tests depend upon Dr. Barany's discovery that syringing the ears with either warm or cold water, *i. e.*, water above or below body temperature, will regularly cause nystagmus in individuals with intact labyrinths. When cold water is used the nystagmus is directed toward the sound ear; whereas irrigations with hot water regularly give rise to a nystagmus in the direction of the diseased labyrinth. When, in a case of suspected suppurative labyrinthitis, nystagmus does not follow upon these experiments, the inference is that the function of the semicircular canal system has been destroyed by the suppurative process.

**TREATMENT.** As to the treatment, judging from the literature of the subject, there is mainly one question which presents itself for settlement, viz., shall we operate in all cases in which we are able to determine the presence of a suppurative labyrinthitis? Dr. Jansen, writing from an experience of "upward of 100 labyrinthine operations," draws the following conclusions:

If we appreciate the freedom from danger of the opening of the vestibular portion, and consider the dangers resulting from subsequent treatment as avoidable, we should be able to set up the principle, as soon as labyrinth disease has been diagnosticated in one of its principal parts, that the operation is admissible in every case in the face of the dangers which may arise to the patient from labyrinthine disease.

I have to state here that in this time of observation I have seen 10 fatal cases among 190 cases of decided labyrinthine disease in which only the middle ear was operated upon. The labyrinth operation was naturally done in the most severe cases.

Now we have indeed acquired evidence from a great number of positively diagnosticated cases of disease, at least of the vestibule portion, that in a great number of cases the labyrinthine disease does not end fatally nor in a chronic ailment, but effects a spontaneous cure.

In my opinion there is not the slightest doubt that, in the majority of these cases, disease of the entire vestibular portion has been present,

even though single or numerous instances of it may be regarded as circumscribed disease of the semicircular canal. We often found, a long time after the cure, negative caloric reaction.

We see from this, without doubt, that the labyrinthine disease in many cases ends in spontaneous cure; also, that it does not always—in fact, not once in the majority—incline to progression, but the cure resulting slowly and labyrinthine symptoms lasting a long time.

The labyrinth operation is permissible in every diffuse infectious disease of the entire labyrinth, or of one of its two portions, especially of the vestibule.

The operation should not be performed when it is a question of circumscribed disease in the labyrinth wall, or in one of the semicircular canals; when the labyrinthine disease is complicated with infectious processes in the posterior cranial fossa, seldom in the middle one; meningitis serosa; cerebellar abscess; caries necrota of the pyramid. As a rule this applies to the horizontal semicircular canal.

When can circumscribed semicircular canal disease be diagnosticated, and, consequently, labyrinthine operation be omitted? According to Jansen this can be done:

1. When the labyrinthine symptoms are not present in excess.
2. When the function of the cochlea is not destroyed.
3. When the caloric reaction is violent, or at least well present.
4. When the fenestra ovale is intact.
5. When acute middle-ear suppuration is wanting, because of the tendency to diffuse labyrinthitis.

Carious processes on the outside of the labyrinth capsule cannot be a reason for performing the opening of the labyrinth.

Operation is strongly indicated: (1) Where serious disease of the entire labyrinth, or one of its two parts, is present—usually the vestibule being affected; (2) when in stapes luxation, after twenty-four hours, the increasing nystagmus, equilibrium disturbances, and coated tongue, grow worse. If fever appears, operation is then demanded.

When is the malady of the labyrinth or only of the vestibule severe?

1. In acute middle-ear suppuration every vestibular disease is serious and dangerous, and every fistula in the semicircular canal is to be regarded as a sign of a present or imminent malady of the entire vestibular apparatus.

2. (a) Upon acute appearance of severe labyrinthine symptoms. (b) Especially in severe labyrinthine symptoms not arising from the pressure of cholesteatomata, granulations, pus on the perforated horizontal semicircular canal, the caloric reaction lacking.

3. When, under observation the caloric reaction is lacking or diminishing, the function of the cochlea diminishes, the vestibular symptoms become gradually worse.

4. Fever without other causes.



5. In cerebellar complications in the posterior cranial fossa, especially meningitis serosa.

6. Severe labyrinthine disease is further recognizable during the operation by (a) appearance of pus, granulations from the fenestra ovalis, or another fistula; (b) greater necrosis, especially at the vestibular wall.

Caloric reaction will be lacking or decreasing except in 1 and 2, where it may be reduced.

Its lack, however, is not necessary, since it alone does not prove the severe malady.

Jansen insists upon especially adhering to the indication for operating in severe labyrinthine symptoms, when not being produced from the middle ear.

Only when they have existed for a long period and the vestibule reaction is well maintained, as well as the cochlear function, can one expect the result of the radical operation. He lost a few patients because in spite of strong labyrinthine symptoms he could not make up his mind to operate at once.

Of the 100 cases reported, only 2 represented operation on the cochlea alone; 22 were on both cochlea and vestibule; and in the remainder the vestibular apparatus alone was opened.

That these cases were most grave is evidenced by the reported mortality of the series; 29 of them died. Excluding 4 which "did not die from the labyrinthine disease," we have still left a mortality of 25 per cent. in a series of 100.

Nineteen cases were acute labyrinthitis from accidental infection by injury through the fenestra ovalis, in the radical mastoid operation; 13 were operated upon with 4 fatalities (37.7 per cent.). From the fact that none recovered "spontaneously," Jansen believes that all such should be operated upon immediately, rather than wait for symptoms to increase or diminish, as they represent the most dangerous class of cases. He says: "These cases, if not operated upon, would probably have met the same fatal end. There is nearly the same period between death and lesion in the operated and non-operated cases. Thus we cannot conclude that the death was accelerated or occasioned through the labyrinth lesion. Even an exceptional spontaneous cure cannot turn me from this opinion."

Drainage of the vestibule is usually all that seems necessary in these cases. On this point he says: "My numerous observations of the labyrinthine lesions have taught me that the greatest danger is imminent from the infectious disease of the vestibular portion, and essentially from the vestibule itself. After having laid bare the vestibule, we may generally consider the danger obviated. We usually combine the exposure of the vestibule with that of the ampullæ; but we do not pay any attention to the semicircular canals, from which we fear no danger. There are no free pathways by which the infection from the semicircular canals

could get into the inner cranium. The smaller a canal is, the sooner it is cured of inflammatory processes.

“Although there exist some free channels leading from the cochlea and capable of carrying infection into the inner cranium, we have to deal with narrow canals similar to those of semicircular canals, and the danger becomes greater only when, by bony destruction, the narrow canals form a larger cavity, with or without sequestra. This seldom or never happens in cases of a rapid course. The infection arises in the vestibule, the disease extends into the vestibular apparatus, the symptoms are those of vestibular irritation, and if we interfere as soon as the welfare of the patient demands a severe infectious process can scarcely have had time to develop in the cochlea.”

There is little doubt that the views of Jansen regarding the indications for opening the labyrinth for acute suppuration, on the symptoms which he presents, will meet with serious opposition, owing to the fact that many have seen cases, following the radical mastoid operation, in which the symptoms pointed out as sufficient indication for interference were present, and which subsequently recovered without operation. Certainly if all of my cases which had exhibited some vertigo, nausea, and vomiting, rise in temperature, and nystagmus had been operated upon at once a large series would have to be reported, all of which eventually recovered without operative invasion of the labyrinth. I believe this is the usual experience of those who operate frequently on such cases.

While one cannot help looking somewhat critically upon the commended management of these acute cases, the part of the paper bearing upon the chronic or latent cases of labyrinthitis impresses one as being of great value, from the fact that the observations are the result of such a vast experience. One is almost overwhelmed, for instance, to read: “In 1896 I reported upon 196 cases of defects of the semicircular canal which, with few exceptions, were located in the horizontal semicircular canal. Since then I have seen 350 cases of infective labyrinthine disease, of which by far the majority were fistulæ of the horizontal semicircular canal.”

Jansen looks upon the operation of opening the vestibule as “simple in technique” and “without danger” to those who have carefully studied the methods. He prefers the route along the horizontal semicircular canal, to the endocranial route. The opening of the cochlea is more dangerous, and he now follows the technique recommended by Richards, the details of which appeared in *PROGRESSIVE MEDICINE* last year.

**Lateral Sinus Thrombosis.** After several years of active discussion, pro and con, it has undoubtedly come to be the usual practice of most otologists to ligate the jugular vein in every instance where a septic clot has been found in the lateral sinus. As a matter of fact, many consider it important to ligate the jugular previous to the opening of the sinus, in order that the possibility of sending portions of a disintegrated thrombus



into the general circulation by the manipulation may be avoided. An additional reason, which is undoubtedly correct, has been advanced, viz., that free bleeding from the proximal end is not sufficient evidence that there is not an obstructing thrombus farther on. Personally I believe that in any case where there is evidence sufficient to warrant the opening of the lateral sinus for the removal of a septic thrombus, the sinus should be compressed by plugs over a normal part of the distal end—no matter how far toward the torcular it has to be uncovered to find a healthy area—and the jugular and its tributaries tied in the neck previous to the opening of the sinus. Cutting off the circulation in normal parts of the sinus and vein, makes it unnecessary to sacrifice the tremendous amount of blood usually expended in “establishing a flow in both directions.” The fact should not be lost sight of that the object of the operation is to prevent general sepsis resulting from doses of poison washed into the circulation from the local infection. With this possibility successfully blocked off in both directions, the local infection can be dealt with safely, without fear of either accidental metabolic foci of infection by breaking up of a clot and sending a portion of it to a distant organ in the blood current, or the fearful hemorrhage usually incident to “establishing the flow” in either direction.

Probably nothing of greater significance in otological literature has appeared in many years than a paper by Emil Gruening at the New York Academy of Medicine, December 11, 1908, embodying the investigations of Libman, at Mount Sinai Hospital, in the last 9 cases of sinus thrombosis operated upon in that institution. Gruening calls attention to the recent results of Leutert, Suepfle, and Libman, in their investigations of microorganisms causing purulent otitis, which were identical—viz., *Streptococcus pyogenes* in more than 50 per cent.; *Streptococcus mucosus* in about 15 per cent. While the pneumococcus, staphylococcus, and other bacteria occasionally appear, these statistics show the prominent position occupied by the streptococcus.

The investigations of Libman showed that lateral sinus thrombosis was most frequently associated with systemic infection. Gruening's last 9 cases had all been investigated by blood cultures made by Libman, taken from the median vein, before and after ligation of the jugular. Of the 9 cases thus examined, 6 showed the presence of bacteria floating freely in the blood; 4 were *Streptococcus pyogenes*; 1 *Streptococcus mucosus*; 1 *Bacillus proteus*; 3 were negative; 7 cases recovered; 1 died of meningitis (negative blood report); the other from the infection by the *Bacillus proteus*. Gruening claims that blood taken from the veins of the arm will demonstrate bacteria in the circulation “more convincingly” than blood taken from the sinus as advised by Leutert. He also points to the clinical data as proof that the *presence of a bacteremia need not necessarily be fatal*; on the contrary, with early ligation of the jugular and obliteration of the sinus, recovery is probable.

The detailed report of 2 of the 9 cases was read—both with positive findings—showing different phases of the disease under different conditions. In the first case it was assumed that the formation of new foci had begun before ligation of the jugular. After a stormy course, during which both mastoids were operated on, the left sinus and jugular excised, a purulent knee-joint drained, and a second opening of the sinus at the torcular end made, the patient finally recovered with good hearing and perfect locomotion. In the second case the only focus of infection was in the lateral sinus and jugular vein. Bacteremia was present; jugular ligation and obliteration of veins with removal of clot was followed by speedy recovery. A second blood culture twenty-four hours later was negative.

In concluding his paper, Gruening said: "In the whole group of 9 cases mentioned, the diagnosis of sinus thrombosis was made from the clinical symptoms alone. The blood culture was not necessary for the diagnosis, but it was important to become acquainted with the relation which sinus thrombosis bears to systemic infection. This relation, once established, will assist us in the proper appreciation of the abscess cases in which the clinical data are insufficient for the recognition of thrombosis of the sinus. That a positive blood culture can be advantageously used as important evidence of the presence of a thrombus, has been repeatedly demonstrated at Mt. Sinai Hospital. Patients who after a thorough mastoid operation did not do well, and whose temperature remained high, though the accessible part of the sinus appeared healthy, improved immediately upon ligation of the jugular, which was thought advisable as the result of a positive blood culture.

"We may even go farther. In two cases admitted to the medical wards with high fever, systemic infection, and no previous history as to ear trouble, Dr. Libman requested me to examine the ears and lay bare the sinus of the side of the affected ear. He arrived at this diagnosis of sinus thrombosis by exclusion of other foci in the presence of a positive blood culture. In both these cases the lateral sinus was found thrombosed, although, with the exception of old perforations of the drum, there were no external evidences of ear disease. The two patients recovered after evacuation of thrombi from the lateral sinus: one with, and one without ligation of the jugular."

Libman, to whom credit is due for the careful investigations, in discussing the paper expressed great confidence in blood cultures as a means of diagnosis of sinus thrombosis, and brought out certain data which are of great value. In the first place, the conditions which may produce chills and fever, and at the same time a bacteremia, are not numerous. When such conditions are present, the bacteremia is always the result of infection taken into the circulation from local suppuration. Therefore, if, in an evidently septic case, blood culture shows bacteremia in the absence of purulent foci in other locations which might produce



it (throat, genito-urinary tract, postpartum, infective endocarditis, etc., any of which are easily demonstrable), the attention is directed to the ear.

Libman believes that bacteremia under such conditions means septic sinus thrombosis, and that no time should be lost in cutting that area off from the general blood current. Admitting these points, it will be seen that a wonderful advance has been made in early recognition of this fearful infection, which promptly acted upon should save many lives in which even a short delay might bring about a fatal issue. In dealing with such desperate conditions, however, there are other points to be borne in mind.

Libman's investigations have brought out other points which are of extreme moment. It seems that bacteria thrown into the circulation are consumed by the phagocytes, and do not multiply as one might imagine. Repeated cultures, taken at intervals following jugular ligation and obliteration of the sinus (in cases of infective sinus thrombosis), have demonstrated that, with the source of infection cut off the bacteria disappear within forty-eight hours, even in the severest infection. In a case with 20 colonies to the centimeter, in the first culture, none could be found in the second, taken eight hours after ligation. In another, with 120 colonies, none could be found twenty-four hours later.

From these interesting facts it would seem that even in a case where infective foci had been started in regions distant from the primary infection, one might fail to find a bacteremia on blood culture owing to this powerful phagocytic action of the blood. The inference would be, then, that while a positive culture would lead to immediate operation, a negative culture would not deter one from operating in the presence of definite clinical signs of thrombosis. The great value of these observations lies in the certain conviction with which one may operate, in an otherwise doubtful case, when the blood culture is positive.

**Brain Abscess.** At the meeting of the New York Neurological Society, at the Academy of Medicine, December 1, 1908, the subject of brain abscess was extensively discussed, from both the diagnostic and operative standpoints, and was entered into by general and aural surgeons, as well as by neurologists. It was quite generally agreed that the largest number of successfully operated brain abscesses could be credited to the aural surgeons, owing to the fact that such a large percentage of cases were of otitic origin and were situated in a position in the brain more favorable for drainage. Gravity being of such importance, abscesses of the frontal lobes—the ones most frequently falling to the lot of the general surgeon—were likely to be less well drained than those of the temporosphenoidal or cerebellar regions. In addition to this, symptoms of localization in the latter two were often present and led to earlier diagnosis.

The proposition that inability to name objects always pointed to an abscess or tumor in the temporosphenoidal lobe, most deservedly

met with opposition. I have seen this symptom present in both meningitis and epidural abscess, and, while its presence together with other symptoms of brain abscess points strongly toward the temporosphenoidal lobe, it must be remembered that pressure from extradural abscess or meningitis may cause it. In this connection, a case reported by William Jansen,<sup>1</sup> of Buer, in Westphalia, is of interest. A young adult had marked speech defects, from a small, left-sided, epidural abscess. On operation Jansen had attempted to locate an abscess in the brain, feeling that such marked speech defects could not be produced in an adult by so small an epidural abscess. The exploration, however, was fruitless, and the patient completely recovered by the evacuation of the epidural pus.

Aside from the question of symptomatology, the Academy discussion brought out a wide variation in the technique. Sachs pleaded for a much wider exposure than was customary among aural surgeons, by the lifting of a large skin and bone flap, claiming that the contour of the underlying dura, under such exposure, often indicated the position of the abscess.

The methods laid down by Ballance, which were detailed in *PROGRESSIVE MEDICINE* for March, 1908, were approved by a majority of the speakers, while others looked upon the "pathway of entrance," or "stalk," as a chimerical approach which could not often be found. All were agreed that a fatal issue, in many cases in which the abscess was located and evacuated, was due to a subsequent infection of the meninges. Under these circumstances, the advantages of doing the operation in two steps—in which the incised dura is packed down upon the arachnoid until adhesion has taken place, in the first operation, and the exploratory punctures made through the area thus walled off in the second—cannot fail to be advantageous where a "stalk of entrance" cannot be found. Personally, I am inclined to the opinion that Ballance is correct about the lesions of otitic origin, and that the "stalk" will be found, in the majority of instances, by those who search carefully for it.

There was an active discussion relative to the most advisable method of exploring and evacuating an abscess which had been located. Whiting contended that his encephaloscope was of inestimable value, while Gruening, Dench, and McKernon thought it of little use. A number contended that a view of the abscess cavity was hardly probable, and preferred the finger for exploration. It would seem rational in many cases to consider both unnecessary and impractical. The object to be kept in mind is to locate and secure adequate drainage for the abscess, avoiding undue traumatism to surrounding brain tissue, and infection of meninges by the contents of the abscess.

Irrigations were condemned by nearly all. McKernon thought there

<sup>1</sup> *Monatsschrift f. Ohrenheilkunde*, August 26, 1908.



was little danger in using irrigations in abscesses of long standing with well-defined walls, but avoids them in acute cases.

There was still a difference of opinion as to the most adequate method of drainage. The majority placed dependence on a few layers of rubber tissue or gauze wicks.

**Surgery of the Facial Nerve.** Dr. Joseph Beck<sup>1</sup> has written an exhaustive article covering the history of thirty-three published cases of facial anastomosis with the spinal accessory, hypoglossal, and glossopharyngeal, as tabulated by Murphy, and adds five cases which he has operated upon, the hypoglossal having been used in each instance. He briefly states the historical data of facial neuroplasty as follows:

“Presumably, Ballance and Stewart were the first to have united the facial and spinal accessory nerves for cure of facial paralysis, in 1895, but did not publish it until 1903. In 1898, at the suggestion of Fouret, Fouré united the facial with the trapezius branch of the spinal accessory. Experimentally, P. Manasse, in 1900, and about the same time Barrago Ciarello, accomplished satisfactory results on animals in uniting the facial with the spinal accessory. Robert Kennedy, in 1900, operated on a man by uniting the facial with the spinal accessory. Harvey Cushing performed the same operation in 1902. After that quite a number of similar operations followed. The hypoglossal, however, was not used until about 1902 to 1903, as cases reported by Ballance and Stewart<sup>2</sup> Koerte, Nicoll, Frazier, Bardenhauer, and Schaefer (of Edinburgh) suggested the union of facial and glossopharyngeal.”

Beck makes a strong appeal for more attention to this important surgery, by the aurist, noting the fact that a large percentage of the operative cases result from suppurative otitis, or trauma of the nerve in operations on the temporal bone, by the aural surgeon, for the relief of otorrhea or some of its complications. That the operation of facial anastomosis is delicate and tedious is only an additional reason why it should be undertaken by the otologist, as these are much more the characteristics of his work than of the general surgeon.

“The indications for operation on the facial nerve are confined to absolute paralysis, no matter from what cause or what the location of the lesion (lower segment), after all other methods have failed. The procedures are usually anastomosis with other neighboring motor nerves—as hypoglossal, spinal accessory, and glossopharyngeal—in the order named. The contra-indications are: (1) When the general condition of the patient will not warrant such an extensive operation; (2) when the other nerves—as hypoglossal, spinal accessory, or glossopharyngeal—are not in good condition or accessible; (3) in cases of congenital absence of the facial muscles or nerve; (4) in long-standing

<sup>1</sup> Annals of Otology, Rhinology, and Laryngology, June, 1908.

<sup>2</sup> British Medical Journal, May, 1903.

facial paralysis where one in making the test of paralysis can safely say that all the muscles supplied by the facial nerve are wasted and beyond possible chance of regeneration. This last contra-indication must, however, be modified, inasmuch as there are cases on record (Hackenbruch) in which the above conditions existed, which were operated upon and recovered."

Excellent anatomical plates and descriptions of the technique are given, and the points are well worthy of study, and practice on the cadaver, by those who wish to undertake the operation. While the results in all reported cases are by no means brilliant, they are sufficiently so in some, and in others have brought about enough improvement to warrant operative interference in every case. The condition of a patient with a one-sided facial palsy is quite pitiful enough to warrant a great hazard, where even a slight chance of improvement or cure can be held out.

Ferdinand Alt,<sup>1</sup> of Vienna, discusses the subject with much enthusiasm in an article on "The Operative Treatment of Otogenic Facial Paralysis," in which he covers much the same ground as Beck, and adds some interesting cases on which he operated by anastomosis of the facial and hypoglossal. He calls attention to the fact that the otologist also has the choice of other and simpler operations which do not damage any other cranial nerve. Having frequently demonstrated before a class in topographic anatomy, the Fallopian canal in its horizontal and vertical portions and opened it to an extent of 5 mm. to show the nerve, he was led to open it in the same manner in the living for the relief of facial paralysis of otogenic origin. He employs the most exact hemostasis during the operation, so that the operative field is not interfered with by bleeding from the smallest vessels. To accomplish this he bleaches the tissue with adrenalin, which he uses freely, so that the work at any depth is no more difficult than on the cadaver. In this manner he brings the Fallopian canal into view, searches for fistulæ and rents in the canal wall, opens the canal, inspects the nerve, and relieves its compression by removing granulations and cholesteatomatous scales. In most cases the retrogression of the paralysis is rapid.

While some cases recover without interference, exposing the nerve and cleaning the Fallopian canal, as he describes it, insures marked success. "Even if the nerve should be damaged by this interference, it need not be looked upon as an irreparable injury, as the severed ends can be embedded in the trough of the canal, where they will again unite." He reports in detail a case of this procedure.

Another case is reported on account of the odd causation of the facial paralysis: A girl, aged nine years, was operated upon by a general surgeon, producing a facial paralysis. The wound cavity was entirely

<sup>1</sup> *Monatsschrift f. Ohrenheilkunde*, August, 1908.



epidermatized with a part of the posterosuperior auditory canal wall still in place. Alt opened up the facial canal toward the periphery and exposed the nerve to its entrance into the cavum tympani. It was not covered by bone in its horizontal position, but was embedded in tough cicatricial tissue out of which the nerve was dissected. The nerve was not damaged in its continuity, much to his chagrin, as he could not believe that this embedding of the nerve in the cicatricial tissue could alone cause the paralysis. Nevertheless, the further course of the case proved this to be the fact. Three weeks later decided improvement had taken place. He recites another case which was entirely cured by removal of the sequestra about the facial canal, which had caused the compression paralysis.

**Cholesteatoma.** Probably there is no subject on which there is more unanimity of opinion among aural surgeons than that of the danger which lurks behind a secondary cholesteatoma in the middle ear. Protracted efforts to avert a purulent discharge are usually unavailing, and the possibility of an intracranial complication is always more imminent in the presence of a cholesteatoma. In view of these facts and of the comparative frequency of the condition, a paper by Mackenzie,<sup>1</sup> of Vienna, on "The Diagnosis of Middle-ear Cholesteatoma," is of unusual interest. He calls attention to the necessity of differentiating between primary and secondary cholesteatoma. The primary forms are usually congenital and appear as small tumors in the external auditory canal, or at the membrana tympani—occasionally as larger tumors in the dura. The secondary forms, which chiefly concern us, appear in cases of chronic otorrhea, as masses of epithelium crowding the middle ear and adjacent structures.

Reviewing at length the different views which had been advanced from time to time in regard to the structure of cholesteatoma, Alexander comes to the recent work of Haicke, confirmed later by Salkowsky, that chemical analysis invariably shows the presence of cholesterin in these formations. Encouraged by this definite proposition, Alexander then sought to prove that cholesterin crystals could easily be shown microscopically in cases where the amounts coming away were too small to demonstrate the presence of cholesteatoma macroscopically, and only by most difficult chemical analysis. After positive findings in a number of cases, sufficient to cast a doubt on much that had been written on the subject, he determined to examine all purulent cases for cholesterin crystals. After clearing the canal and middle ear by irrigation and swabbing, an attic syringe was used and the return flow caught. Where the return showed a large amount of detritus it was allowed to settle in a test tube, and a portion of the sediment was examined under a moderately low-power lens. Where necessary a centrifuge was used.

<sup>1</sup> *Monatsschrift f. Ohrenheilkunde*, April 21, 1908.

When present the characteristic rhomboid crystals of cholesterin were easily demonstrated.

Seventy cases of purulent middle ear were thus examined: 10 acute; 5 subacute; 55 chronic. Among the chronic cases 23 (42 per cent.) showed cholesterin crystals, and the trustworthiness of the method was demonstrated from the fact that all showing crystals in the microscope were found on operation to have cholesteatoma; 1 of the 10 acute cases showed the presence of cholesterin crystals. In 16 of the cases there were other complications: 3 cases of fistula of the horizontal semicircular canal; 3 cases of circumscribed pachyleptomeningitis; 2 cases of subperiosteal abscess and antrum fistula; 4 cases of facial paralysis; 1 case of epithelioma of the middle ear; 2 cases of serous labyrinthitis; 1 case of lateral sinus thrombosis.

These reports would indicate that an otorrhea with cholesteatoma was more likely to lead to intracranial and labyrinthine involvement than one without it.

In the 9 remaining cases, not deeming immediate operation necessary, palliative measures were used for some time. Every case, however, eventually came to operation.

From this experience Alexander advises early operation in every case where cholesteatoma is discovered. This becomes absolute on the appearance of symptoms of intracranial or internal ear involvement. "Conservative treatment is only permissible in cases where there are no symptoms of otitic complications, and where the cholesteatomatous diseased ear is the better hearing ear: Yet here the patient should be under constant observation. It must, however, be emphasized that, barring exceptional cases, the permanent cure of a diseased middle ear with cholesteatoma is only accomplished by operation. In the evacuation of the middle-ear cavities, we are not alone concerned with the removal of the cholesteatoma in its entirety, but also the surrounding bone, which is always affected with the matrix of the cholesteatoma and contains the cholesteatoma buds. In many cases the dura and sinus and the facial were already exposed by the cholesteatoma. If there were no symptoms of a regionary complication, the exposure of the dura and sinus was enlarged by removal of the bone surrounding them. In this way one avoids leaving behind parts of the cholesteatoma which have reached between the dura and bony wall, or the sinus and bony wall."

In marked contrast to these findings and the deductions from them, was a paper by Ruppert,<sup>1</sup> of Munich, on the "Treatment and Prognosis of Chronic Middle-ear Discharge." This paper appearing as it did, just before the meeting of the German Otological Congress in June,

<sup>1</sup> Münch. med. Wochenschrift, 1908, Nr. 21; abstract by Horn, *Annals of Otology, Rhinology, and Laryngology*, September, 1908.



1908, was very favorably received there, voicing as it did the sentiments of the famous head of the Munich Clinic, Professor Bezold, where conservative treatment of middle-ear suppurations is carried to its extreme limits and operative interference is the exception. The author, one of the assistants in the clinic, recognizes the fallibility of statistics based on ambulatory clinic material, where the attendance is always irregular, and where the assistants are always changing, and takes instead the statistics from Schiebe, of Munich, a former pupil of Bezold. In the seventeen years covered in the investigation, from 1889 to 1906, the author acted as assistant for the last four. Bezold's boric acid powder treatment was the only method used. The patients were treated every day until the abatement of the discharge, and then two to three times a week. Under the term "Chronic Middle-ear Discharge" the author places only those cases of inflammation of the middle-ear cavities where a perforation remains continuously open and discharges for years, following the original acute attack, or where the perforation has remained open because of scar tissue, and after years sets up a chronic discharge. Even cases of acute middle-ear suppuration, which continues a full year before resolution, were not considered in these statistics, as the perforation finally closed when the discharge ceased. In the seventeen years, 1118 cases of chronic middle-ear discharge were treated; of these, 38 or 3.4 per cent. showed complications from the beginning. The remaining 1080 were uncomplicated. Of this number 592, or 55 per cent., had a central perforation; the remaining were either in Schrapnell's membrane or involved\* the annulus tympanicus. The minute description of the technique of the treatment, which because it is a type of this method as it is so commonly carried out in Germany, is repeated here in detail.

After a thorough syringing out of the external auditory meatus with a 4 per cent. solution of boric acid and politzeration, a fine, curved, cotton applicator was used very carefully to dry out the middle ear by introducing the cotton directly through the perforation. An insufflation of the most finely powdered boric acid was then made.

In 10 per cent. of the cases with central perforation the formation of granulations and polypi was noted. These were removed only with the snare or curette, the author claiming a certain danger of facial paresis or even total deafness through the use of chemical cauterants.

The disagreeable odor usually disappeared after the first treatment, always after the second; 371 cases, or 93.9 per cent., were completely relieved for a period of always more than one-half year following the cessation of the treatment. In 18.5 per cent. the discharge ceased after the first treatment; in 28.1 per cent. the discharge ceased inside of a week; in 28.6 per cent. the discharge ceased inside of a month; in 8.6 per cent. the discharge ceased inside of two months; in 3.5 per cent. the discharge ceased inside of three months; in 3.5 per cent. the discharge ceased inside of six months. In only 2 per cent. did the treatment last a year, and in

4 cases, or 1 per cent., the treatment was carried out for a longer period of time. In 24 cases, or 6.1 per cent., the discharge continued in spite of treatment covering years. An interesting analysis of the cases where the healing covered a period exceeding six months is given. Some of the cases were treated at home, others lived under very unfavorable conditions, and in still others a strumous diathesis seemed to play an important role in the delay.

Most of the 124 uncured cases have been under observation from five to eighteen years, and none has developed complications or shown a tendency to recurrence of the fetid secretion. One of the cases which had been so long under treatment was operated upon (not by the author), but the discharge never ceased.

Of the 395 central perforations, 2 were operated upon by the author. In one with a small, round, central perforation, which after more than six months' treatment discharged a smelling crumbly pus, the radical operation was performed. No cholesteatoma or necrosis was found, and the author believes that a little more patience would have led to a complete conservative healing. The second case was an hysterical individual, whose alarming symptoms pointed to a meningitis serosa and involvement of the labyrinth. Nothing but a diseased condition of the mucous membrane was found at the operation.

In seventeen years 489 cases of perforations involving the annulus were observed. Of these, 59.8 per cent. remained under treatment. Here, anatomically and pathologically, a new set of conditions was to be combated. The Hartman tympanic tubes were used to wash out the attic and antrum; a drying with cotton on the end of a carrier, with a slight bend upward, followed; and the treatment was concluded by blowing powdered boric acid through the perforation into the antrum itself.

The formation of polypi was much more common in this group, 59.8 per cent., as compared with the central perforation cases. The extraction of the ossicles was not found necessary in a single instance. The author saw many cases of so-called caries with cholesteatomous masses in the antrum go to complete healing after the conservative treatment of the discharge. Of these 359 cases, 82 were perforations in Schrapnell's membrane. The formation of cholesteatoma was noted in 53.8 per cent. of the perforations which involved the margo tympanicus, and in 70.5 per cent. of the cases with the perforation in Schrapnell's membrane.

As was to be expected, the time of healing in this group was notably longer than in the first: 8.9 per cent. were cured by the first treatment; 18.4 per cent. inside of eight days; 25.6 per cent. within one month; 11.7 per cent. within two months; 5.6 per cent. within three months; 7.6 per cent. within six months; 7.2 per cent. within twelve months; 4.5 per cent. more than a year; 10.6 per cent. remained uncured. In the 359 cases 352 were healed by conservative methods, and 7 came to



operation. The remarkable results achieved here and the general discussion of the same theme later in the German Otological Congress, give one a good idea of the conservative methods now in vogue in Germany. There are evidently two sides to this question in German schools.

**After-treatment of the Radical Mastoid Operation.** This has been the subject of much discussion during the past year. Many have contended that healing took place more rapidly and satisfactorily without the use of gauze packing, while others have asserted that the use of pressure tampons of gauze were frequently necessary to prevent the formation of a bridge, or complete septum from the facial ridge to the anterior wall of the tympanum.

Dr. Erich Ruttin,<sup>1</sup> Assistant to Politzer in the Universitäts-Ohrenklinik, in Wien, reports in detail the results in 22 cases in which the "tamponless after-treatment" was attempted, and sums up the results as follows:

1. Entire epidermatization of the tympanum, with closely adherent epidermis on the inner tympanic wall.
2. Entire epidermatization of the wound cavity, with septum formation.
3. Healing with mucous membrane.

The first is the most ideal form of healing, and is the one that in the majority of the cases is protective against recurrence. In this method of healing the configuration of the labyrinth wall is either preserved, or the details of the labyrinth wall have become obscured by the filling in of the niches with connective tissue. In the cases reported, 7 belong to the first and 5 to the last form. The entire series of cases was free from recurrences (although the time of observation was short). According to Uftenorde, it also appears that this form of "tamponless after-treatment," on account of the rich granulation, is more unfavorable for the functional result than the after-treatment with tampons.

In the healing with septum formation, two forms were noted: (1) With a septum in front of an already dry tympanum—that is, cicatricially changed, but not epidermatized, inner tympanic wall; (2) with a septum in front of a tympanum secreting pus.

The septum formation in front of a dry tympanum is an ideal result, so far as the curing of purulency is concerned, but experience shows that the functional result suffers much. Ruttin mentions a case in which the hearing distance for conversation was 1 mm. and which increased to 4 mm. for conversation after crucial incision and excision of the so-formed flaps. In these cases, however, the splitting and excision of the septum does not secure permanent results, as the septum quickly reforms—evidently because the epidermis cannot attach itself to the cicatricially healed tympanic walls. Under any condition it is undesirable to have septum formation over a still secreting tympanum. A tympanum walled off in this manner is not to be considered as healed. On the contrary,

<sup>1</sup> Monatschrift f. Ohrenheilkunde, April 11, 1908.

one can be certain that a recurrence will take place, pus breaking through at the thinnest part of the septum, which is usually situated about the middle, occasionally, when persistent pus secretions are present, at its anterior part. This outbreak may occur without any pain, but often retention symptoms show previously.

These septum formations in tamponless treatment are relatively of frequent occurrence, as shown by a number of Ruttin's cases as well as those of Alt, reported in the session of the Austrian Otological Society, June 24, 1907. The same occurrence was reported at the Berlin Otology Society, December 10, 1907. Whether the other authors who have taken up the question of the tamponless treatment regard these cases as healed, as does Alt, cannot be judged from their articles.

Other conditions play a part in septum formation. Naturally, an incomplete operation—especially incomplete in view of the fact that the spur of the facial and the lateral attic wall were not sufficiently reduced—always is a predisposing cause. These cases show typically how the septum gradually grows, in crescentic form, from the facial ridge to the attic.

Yet an operation in every way complete may leave a favorable condition for septum formation, if the surgeon chisels away much of the anterior auditory canal wall. Then the granulations coming from the anterior auditory canal wall may grow toward those shooting up from the facial promontory and, meeting, lead to septum formation. So, too, the traumatism caused by retractors during the radical operation at the medial end of the cartilaginomembranous auditory canal wall, brings about the same result.

When the predisposing conditions are present, the septum formation cannot with certainty be avoided, even with the treatment by tampons, although then this occurs only in exceptional cases, whereas without tampons it seems to be the rule. In Ruttin's 22 cases, septum formation occurred eight times; and of these, 7 cases had a later breaking through of the septum, usually with pain in the ear and head, vertigo, and nystagmus toward the affected side. In 4 of these cases, after crucial incision of the septum and excision of the flaps, it was attempted to again carry out the tamponless treatment; yet in all but 1 of the cases the septum reformed, and success was attained only after repeated excision of the septum and the use of tampons to keep it patent.

Case VII, in spite of the septum, remained permanently dry. In Cases X and XIII, after excision of the septum, the tamponless treatment was given up at once and the tampon treatment carried out to successful healing. In Case XII it was impossible to overcome the secretion, which was accounted for by a stubborn pus tube. He calls attention to partial septum formations which close off furrows or niches of the operative cavity, such as the remaining trough, after taking away the lateral antrum wall or the opened attic. To such conditions Politzer, Gompertz, and



others have already called attention, and Urbantschitsch mentions them in his case of "tamponless treatment" (Austrian Otology Society, June 27, 1907).

Under "mucous membrane healing" is understood "healing in which the rest of the wound cavity is covered with epidermis, except the labyrinth wall, which has the configuration entirely preserved and is covered with a pale or reddened non-secreting—or to a slight extent secreting—mucous membrane, which is divided by a sharp boundary from the epidermatized wound cavity. This boundary shifts but little, or not at all, after a month or a year of observation following the radical operation." The epidermatization of these places can only take place by metaplasia, to which the tympanic cavity mucous membrane has no particular tendency. The cases in which we must grant an undoubted metaplasia, where isolated islands of epidermis appear on the inner tympanic wall (Hammerschlag), are very unusual.

Ruttin emphasizes that he is not an opponent of the "tamponless treatment," having used it for a long time, but after the experience gained in Politzer's clinic, in view of the frequent occurrence of septum formation in the after-treatment of the radical operation, he would not like to concede it the exclusive place in after-treatment given to it by others. In every case "showing a disposition to septum formation it has no place, and resort must be had to the tamponade." Even with this, one cannot always avert septum formation.

He expresses himself as being in entire accord with Stacke, that a small slit, whose lumen is not even visible after removing the tampon, but is only demonstrated with the probe, cannot for any length of time be held patent. But he claims that this slit cannot compare with the ring-shaped contractions that lead to septum formation. On the other hand, he is not altogether in accord with Stein, who believes that these cases of septum formation cannot be prevented with the tamponade. The ring-shaped contractions caused by granulations and the ultimate closure of narrow bony canals can very well be prevented by tamponade and allied measures, as we are here concerned with a real mechanical condition. The septum formation must be prevented, particularly when it appears early and there is still a purulent cavity behind it. Ruttin warns against the enthusiastic optimism which is expressed in this new teaching.

**Otosclerosis.** At the meeting of the American Otological Society, June 24, 1908, a symposium on otosclerosis was read by Harris<sup>1</sup> (Etiology); W. S. Bryant<sup>2</sup> (Pathology and Prognosis); and Shambaugh<sup>3</sup> (Symptoms and Diagnosis).

In view of the progress which has taken place in our knowledge of the anatomical changes which occur in this condition, as noted in PROGRES-

<sup>1</sup> *Annals of Otology, Rhinology, and Laryngology*, September, 1908.

<sup>2</sup> *Ibid.*

<sup>3</sup> *Ibid.*

SIVE MEDICINE last year, the attitude of the first two writers is somewhat surprising. This attitude has resulted, no doubt, from a confusion of the other conditions which cause progressive deafness with that of "rarification," or "spongification" of the labyrinthine capsule, which alone, in our present knowledge, can be looked upon as true otosclerosis. It is not surprising that frequent mistakes in diagnosis should take place, owing to a similarity in functional tests and subjective symptoms; nevertheless, in considering the etiology and pathology, it would seem that the definite anatomical structure peculiar to a certain type of cases should always be kept in mind for those styled otosclerosis. These are invariably hereditary and, from the very nature of the lesion, characteristic symptoms always begin in early adult life, at an age when in normal individuals these changes in the bone should stop. Naturally, these changes, like all other pathological changes, are rapid in some cases, slow in others; slight in some, extensive in others, thus giving rise to profound deafness—coming on early in some cases, late in others; or, to slight deafness, which does not seem to progress in some, or progresses very slowly in others.

A different nomenclature should be adopted and a different view taken of all cases where similar variations of impaired hearing have resulted from previous inflammatory or catarrhal lesions in any part of the conducting apparatus (middle ear). A different mode of treatment should be adopted, and a different prognosis is permissible. Such a view of the situation was taken by Shambaugh,<sup>1</sup> who contributed a most excellent paper on the "Symptoms and Diagnosis of Otosclerosis."

After calling attention to the well-recognized features of the disease, the insidious onset, beginning in early adult life; the varying amounts of deafness, and difference in character of tinnitus; the usual involvement of both ears, pointing so strongly to hereditary origin; the variations in the progress of deafness; the vertigo, slight pains and fulness in ears, and the paracusis Willisii often accompanying the other symptoms—he states the problems confronting us in the differentiation of otosclerosis from nerve deafness and deafness due to middle-ear disease. In distinguishing it from nerve deafness, he refers to three distinct types: (1) Those cases where the defect in hearing is due entirely to the fixation of the foot plate of the stapes; (2) those cases where, in addition to the defect in hearing caused by the fixation of the foot plate of the stapes, there is also a more or less extensive defect in hearing caused by an involvement of the structure of the cochlea; and (3) those cases of otosclerosis where the spongifying of the capsule of the labyrinth has produced no interference with the action of the foot plates of the stapes, and where the defect in hearing is, therefore, due solely to disturbance in the function of the structures in the cochlea.

<sup>1</sup> *Annals of Otology, Rhinology, and Laryngology*, September, 1908.



“In the first group of cases, where the defect in hearing is due solely to the fixation of the foot plate of the stapes, the diagnosis from nerve deafness presents no difficulties for even the incipient stages of this process, and where the defect in hearing for the voice is but slight the interference with the action of the stapes already produces the prolongation of the bone conduction, the shortened positive, or even negative Rin  , and the elevation of the threshold for the perception of the lower tones which are characteristic of an obstruction in the conducting mechanism. In nerve deafness, just the opposite reactions are found. Here the duration of bone conduction is more or less shortened, provided both ears are involved. The Rin   is always positive, when the tuning fork can be heard at all, except, of course, in those cases of nerve deafness which are limited to one ear, where the Rin   will be negative, provided the defect in hearing is at all marked. In partial nerve deafness, too, the defect in hearing is limited, as a rule, to the upper part of the scale, although, of course, it is not impossible in nerve deafness to have a disturbance limited to the upper coils of the cochlea, with a defect for the lower tones while the higher tones will still be heard normally.

“In the second group of otosclerotic cases, where in addition to the defect in hearing produced by fixation of the foot plate of the stapes there is also a more or less extensive defect due to involvement of the structures in the cochlea, the diagnosis is often by no means so clear. This is particularly true in those advanced cases where the labyrinthine deafness is extensive, a condition to which the term *disacusis* has been applied.

“The underlying pathological condition in otosclerosis, the spongifying of the bony capsule of the labyrinth, while beginning in most of the cases in the immediate neighborhood of the fenestra vestibuli and in this way producing usually an early fixation of the foot plate of the stapes, is not always restricted to this part of the labyrinth capsule. The same change may take place in other parts of the capsule as well, producing, as we have already pointed out, the disturbance in equilibrium when the vestibular part of the capsule is involved. In the same way, apparently, disturbances in the function of the organ of Corti are produced when the adjacent capsule of the cochlea becomes involved in this spongifying process. These disturbances in the cochlea appear to be circumscribed and limited in a measure at least to the areas in the cochlea in more or less close relation to the part of the capsule involved. It is probably in this way we have produced in most of the typical cases of otosclerosis, even in the incipient stage, a defect for the higher notes of the Galton whistle, because that part of the organ of Corti stimulated by the higher notes of the Galton whistle lies under the promontory in close relation to the fenestra vestibuli—in other words, in close relation to the part of the labyrinth capsule involved in the spongifying process. Bezold has found cases of otosclerosis with circumscribed defects in the middle of

the scale for part of the Galton whistle, and I have this past year studied a case of probable otosclerosis in which was found a circumscribed tone island as well as a circumscribed defect in the midst of the tone scale.

“With the knowledge of the fact that in otosclerosis the disease of the capsule of the labyrinth is not always limited to the region of the fenestra vestibuli, but may spread more or less extensively throughout the capsule of the cochlea, producing a loss of function of the part involved, we can readily understand these cases of disacusis where in addition to the defect in hearing produced by the fixation of the foot plate of the stapes there exists a more or less extensive involvement of the capsule of the cochlea, with symptoms of nerve deafness. These cases fall naturally into two groups: (1) Those cases where in addition to the defect in hearing produced by the fixation of the foot plate of the stapes there is a defect due to a more or less extensive involvement of the basal coil of the cochlea. In these cases we will find in addition to the elevation of the lower-tone limit a more or less extensive defect for the higher notes of the Galton whistle, yet the Rinné will be found to be negative, and there will be found a prolongation of the bone conduction.

“The second group of cases of disacusis includes those where, in addition to the defect in hearing produced by the fixation of the foot plate of the stapes, and the loss of hearing for the higher tones produced by the spongifying of the promontory, there exists extensive nerve deafness throughout the middle of the scale, evidently because of the involvement of the capsule of the cochlea at a distance from the oval window. The functional tests in these cases, provided the hearing in the opposite ear is gone or both ears are similarly involved, may give all the typical reactions due to nerve deafness—that is, a pronounced defect in the upper part of the scale for the Galton whistle, a shortened bone conduction, and a positive Rinné for the  $a^1$  fork—and in addition there will be the marked elevation of the lower-tone limit due to the fixation of the stapes. Whether the Rinné will be positive or negative in such cases depends upon whether the deafness for the particular fork used in making the test is part of the defect in hearing resulting from the fixation of the stapes, or whether the deafness for this fork is the result of the disturbance in the cochlea due to the spongifying of its bony capsule. In the first case the Rinné will be negative, while in the latter it will be positive. This also applies to the results obtained in making the Schwabach test. The duration of bone conduction may be prolonged or shortened, depending on whether the defect for the fork is caused by the fixation of the stapes or by changes in the structures in the cochlea. When these facts are kept in mind, we can readily understand the explanation of such results as a prolongation of bone conduction for the A fork, and at the same time a shortening of bone conduction and a positive Rinné for the  $a^1$  fork in the same case, a result not infrequently met with.

“We come now to the third group of otosclerotic cases, those cases



where the foot plate of the stapes has remained free, and where the spongifying of the capsule of the cochlea has produced more or less extensive nerve deafness.

“Siebenmann was the first to report the postmortem findings in such a case, where the functional tests indicated nerve deafness, and where foci of spongifying in the capsule of the cochlea established the diagnosis of otosclerosis.

“The diagnosis of these cases from the other causes of nerve deafness cannot, with our present knowledge, usually be made. In some of these cases, however, the diagnosis of otosclerosis can still be made with a reasonable degree of certainty.

“The diagnosis of otosclerosis with fixation of the stapes from deafness due to middle-ear disease can, as a rule, be readily made. Whenever there is found a normal drum membrane and Eustachian tube in a case of insidious development of deafness where the functional tests show an interference with the conducting mechanism, such as a prolongation of bone conduction, a negative rinne, and a decided elevation of the lower-tone limit, the diagnosis of otosclerosis is justified.

“In the incipient cases of sclerosis, where the defect in hearing is still only slightly developed, the question will sometimes arise whether this defect might not be due to an adhesive middle-ear catarrh in which the alteration of the drum membrane is so slight as to be scarcely discernible. Yet in these incipient cases the diagnosis of otosclerosis can often still be made with a reasonable degree of certainty by finding the evidences of obstruction in the conducting mechanism, the prolongation of bone conduction, and the elevation of the lower-tone limit, developed out of proportion to the degree of deafness.

“It is often claimed that a diagnosis of otosclerosis in these incipient cases can be made by noting the absence of improvement in hearing after inflation, whereas, in beginning deafness due to catarrh of the middle ear, considerable improvement after inflation is usually noted. This test cannot always be relied upon, as one occasionally finds considerable improvement in hearing after inflation in these cases of beginning otosclerosis, where the foot plate of the stapes is still apparently not firmly fixed by ankylosis.

“Still more difficult than these incipient cases are those cases where an otosclerosis develops on top of some previous middle-ear disease. Anything like a positive diagnosis in such cases is usually out of the question. Still, otosclerosis may be suspected in spite of the presence of alterations of the membrana tympani where the development of the disease is an insidious one, coming on early in life, and where the functional tests show in proportion to the degree of deafness an exaggerated prolongation of bone conduction and negative rinne, together with a marked elevation of the threshold of hearing for the lower tones, and a well-developed defect for the higher notes of the Galton whistle. The

diagnosis of otosclerosis will be all the more certain in such cases when the history shows other cases of deafness in the same family coming on insidiously in middle life and resulting finally in profound loss of hearing.

"With the knowledge that the process known as otosclerosis or spongying of the capsule of the labyrinth is by no means restricted to producing bony ankylosis of the foot plate of the stapes, but that there occurs at times a more or less extensive involvement of the capsule of the cochlea, producing symptoms of nerve deafness, as well as of deafness due to fixation of the stapes, the problem of diagnosis becomes at times one of the most difficult in the whole field of otology.

"On the other hand, as I have attempted to bring out in this paper, with the knowledge we now have of the pathology of this condition, the manner of onset, and the associated clinical symptoms, the diagnosis of otosclerosis not only from nerve deafness, but from other conditions producing obstruction in the conducting mechanism, can usually be made with all the positiveness which any problem in diagnosis permits."

Alt,<sup>1</sup> in a contribution to the anatomy of congenital deafness, reports the case of a man, aged thirty-three years, a deaf mute, who died of pulmonary tuberculosis; he had been a deaf mute from birth; one sister was a deaf mute, and a younger brother was markedly deaf. Examination showed complete deafness for speech, tones, and noises, with normal membrana tympani; no air or bone conduction with forks; he had only tactile sensation with strong vibration of low forks. Macroscopically, the temporal bones showed no pathological changes. Both auditory canal and membrana tympani (right and left) were normal. Sections were made horizontally through the axis of the cochlea. Alt examined microscopically the right and left auditory organs, the right and left cochlea, the nervi cochleæ, the central nervous system, and concludes as follows: The difference between both auditory organs consists in the total absence of the cupulæ on the right side and an atrophic condition on the left side. The difference in the structure of the cochlea—in which he found the axis atrophic on the right side, and the axis of the left greatly reduced—consisted only in connective tissue in the region of the second coil and the absence of the axis entirely in the third coil. Collectively, he would say that the middle ear was essentially normal; the labyrinth, in a typical way, abnormally involved. The nerve endings, however, had only reached an incomplete development, and had furthermore undergone a supplemental atrophy which involved for the greater part the vestibular section and, in the cochlea, involved the entire end-organ (hair cell) epithelium, and even caused the collapse of the membranous labyrinth of the ductus cochlearis. Noteworthy, too, is the fact that the nerves themselves in the region of the inner auditory canal appeared much less atrophic than in the single nerve

<sup>1</sup> *Monatsschrift f. Ohrenheilkunde*, April 21, 1908.



canal and in the end-organ epithelium. Nowhere was there evidence of inflammation, since there was no cicatricial tissue or increase in connective tissue. The perilymph space was free throughout, or only crossed in a normal measure by narrow connective tissue strands, which served to suspend the membranous labyrinth. The only place that could possibly be interpreted as an evidence of an inflammatory reaction was found in the strands of connective tissue within the septum ring, and the fossula fenestra rotundum on the left side; yet here he could not exclude the possibility of arrested developmental bridges of embryonic mucous membrane cushions.

Alexander and Mackenzie,<sup>1</sup> of Vienna, have made a valuable contribution to the *clinical pathology of the internal ear*, embodied in a tabulated report on the "Functional Examination of the Organ of Hearing in Deaf Mutes." The examinations were made from the Ohrenabteilung der allgemeinen Poliklinik in Vienna, and the tabulated reports of 51 cases comprised a vast amount of labor which will add much to the previously detailed reports of Bezold, Brühl, Warner, Alexander, and Kreidl, Frey and Hammerschlag, Pollak, and others, since it includes many added points of interest, particularly in the examination of the static labyrinth.

The examinations attempted to test the reliability of all the previously known and the lately devised methods, and they gave particular attention in their examinations to the disputed questions, endeavoring to clear up the question lately discussed about the disturbances of labyrinthine equilibrium. This work is in addition to the clinical examinations recently made by George W. Mackenzie<sup>2</sup> in respect to the goniometer and the galvanic examination methods. They call attention to the differences of opinion regarding the disturbances of equilibrium which still exist. All examiners agree that in a constant and not inconsiderable percentage of deaf-mute cases disturbances of equilibrium are found. But why in some cases and not in others, is still an unsolved question, and the reasons appearing in the different literature are at present theoretical only. They were able to group their cases as follows:

1. Deaf mutes without irritability of the cochlea (totally deaf), and the static labyrinth.
2. Deaf mutes with partial destruction of the internal organs of hearing, and excitable static labyrinth.
3. Deaf mutes with partial destruction of the internal organs of hearing, and complete destruction of the static labyrinth.
4. Deaf mutes with total destruction of the internal organ of hearing (totally deaf), and excitable static labyrinth.

This division allows of a better grouping than was possible before. Originally they (the deaf mutes) were grouped solely according to the

<sup>1</sup> Monatschrift f. Ohrenheilkunde, August, 1908.

<sup>2</sup> Archiv und Monatschrift f. Ohrenheilkunde, 1908.

quantity of the internal destruction (Stard); later came the equilibrium separation, with prominence of the internal destruction according to the height of the pitch (Bezold); Alexander and Kreidl made anatomical comparisons with animals with congenital anomalies (cats, dogs, mice), dividing into "congenital" and "acquired" deafness. This division was plainly faulty, because one was limited to the statement of relatives, and in cases of early deafness (in the first or second year) these statements are very unreliable. Alexander and Kreidl refer particularly to this possible error in their article.

In all cases these data included: (1) Age and name; (2) history; (3) classification articulation, reading, fitness; (4) otoscopic condition; (5) subjective impressions—tinnitus, noises, etc.; (6) functional examination of organs of hearing; (7) functional examination of static labyrinth—(a) spontaneous nystagmus, whether rotatory or horizontal, right or left, whether noticeable with eyes to same side, straight ahead, or to other side, (b) excitability of static labyrinth by turning (turning chair), (c) galvanic irritability in milliampères, with cathode and anode at ear; (8) disturbance of equilibrium—walking forward and backward, running forward and backward; hopping on one leg forward and backward—all this with eyes open and closed; (9) goniometer—with this were produced head movements—forward, backward, right, and left, with eyes open and closed (the examinations on the goniometer were made with the patient barefooted); (10) vision test; (11) pupil reaction; (12) deep reflexes; (13) coördination. Many of these examinations were made repeatedly.

The caloric irritability was not tested, because with intact *membrani tympani* the cold-water irrigation must be prolonged, often causing nausea, and possibly a rupture in restless and nervous patients. With a dry perforation it is not advisable to irrigate with cool water, owing to a possibility of a recurrence of the purulent condition. This test was omitted, as they had already judged the irritability of the static labyrinth with the galvanic test and the turning stool.

**Changes in Hearing in Advanced Life.** Hugo Ziffer, Otologist at the University Ear Clinic, Budapest, contributes a valuable contribution on "The Changes of the Hearing Organs in Advanced Life."<sup>1</sup> Patients of advanced age were examined at the Public Almshouse. The object of this investigation was to decide how often a particular ear disease occurred in advanced life, and also in what measure the methods of examination now available may be useful in arriving at a diagnosis in such conditions. He paid particular attention to those senile yet physiological changes which decidedly interfere with or shorten bone conduction. At this time the Almshouse had 315 inmates; 150 males and 165 females. Upon the request that all who had any ear difficulties should

<sup>1</sup> *Monatsschrift f. Ohrenheilkunde*, April 28, 1908.



report, 31 of the inmates responded (9.8 per cent.). The division according to age was as follows:

	Cases.
55 to 59 . . . . .	4
60 to 65 . . . . .	2
66 to 70 . . . . .	5
71 to 75 . . . . .	8
76 to 80 . . . . .	5
81 to 83 . . . . .	7

The majority were over 70 years. The following diseased conditions were found:

	One side.	Both sides.	Total.
Simple acute otitis media . . . . .	1	..	1
Deafmutism . . . . .	..	..	1
Deafness + senile marasmus . . . . .	..	..	1
Otitis media residua + secondary affections of internal ear . . . . .	1	1	2
Chronic catarrh of tympanic cavity . . . . .	..	1	1
Chronic catarrh of tympanic cavity + secondary affections of the internal ear, otosclerosis . . . . .	2	3	5
Otosclerosis . . . . .	..	1	1
Otosclerosis + affections (secondary) of internal ear . . . . .	..	4	4
Primary disease of internal ear . . . . .	..	15	15
	<hr/> 4	<hr/> 25	<hr/> 31

In this table it is remarkable to note the absence of chronic purulent otitis media, and that there were only two cases of residual otitis media. This is accounted for by the fact that purulent otitis is a severe disease, and in the cases which do not heal it generally leaves a fatal complication; those who have suffered during their youth with a chronic purulent otitis media and did not recover seldom reach an age between sixty-five and eighty-three years. The statistics of Körner corroborate this. He tabulated cases of otitis media complicated with intracranial lesions, according to age, as follows:

Years.	Per cent.
1 to 10 . . . . .	17.88
11 to 20 . . . . .	29.66
21 to 30 . . . . .	28.45
31 to 40 . . . . .	12.19
41 and over . . . . .	11.81

Over 40 years, the cases of intracranial complications show a decided fall; and over 50, become rare.

From the above-tabulated cases it may be seen that in advanced age the affections of the internal ear are in the majority: 21 of these cases showed high-grade deafness, viz.:

	Both sides.	One side.	Total.
For conversation speech, total deafness . . . . .	4	5	9
For whispered voice deafness, however, with hearing for speech and conversation . . . . .	5	4	9
Hearing whispered voice and conversation, but deaf for speech over 1 mm. . . . .	2	3	5
Hearing whispered voice 0.75 mm. . . . .	5		5
	<hr/> 16	<hr/> 12	<hr/> 28

By disease of the internal ear we understand, in the clinical sense of the word, those changes in which the appearance of the membrana tympana and the condition of the middle ear do not account for the impaired hearing or the deafness, and in which, with the help of tuning-fork examination, we can prove that we have to do with a change in the sound perceptive apparatus.

The conditions *sine qua non* which form such tuning-fork findings are:

1. The shortening of the bone conduction (Schwabach's experiment).
2. The shortening of hearing for high tones in air conduction and their eventual obliteration (Heber's experiment is totally unreliable).

To differentiate between primary and secondary affections of the internal ear, the following rules are sufficient:

To diagnosticate primary affections of the internal ear, it is necessary that the middle ear shall be normal, *i. e.*, shall have a normal membrana tympani or one with slight changes, and a normal Eustachian tube.

The functional examination shall exhibit no sound-conducting impediment, *i. e.*, the result of the Rin   experiment should be positive, and there should be no shortening of the lower-tone perception by air conduction, except in decided impairment of hearing.

With secondary affections of the internal ear we find, as a rule, evidences of those middle-ear conditions which were transmitted to the labyrinth, such as destruction of the membrana tympani, evidences or residue of catarrhal processes in the tubes, etc. The functional tests in secondary affections will result as follows: Rin  , negative; bone conduction (Schwabach), shortened; absence in, or shortening of the lower tones for air conduction ( $C_2$ - $C$ ); absence in or shortening of the high tone for air conduction ( $C_3$ - $C_5$ ). The patient can hear the middle tones well ( $C$ - $C_2$ ). For the examination of the high tones Ziffer used a fork with 2048 vibrations, also Galton's whistle; for the lower tones, a clamped large C-fork with 64 vibrations; for the Weber, Rin  , and Schwabach tests, a C-fork with 256 vibrations, with foot plate, was used.

He found the Weber test unreliable, as did Belgrads.<sup>1</sup> The Schwabach test was also unsatisfactory to determine absolutely the shortening in bone conduction, because of the advanced age, in which state the bones are enriched with calcium salts and so lose their elasticity and

<sup>1</sup> Archives of Otology, lxx, 51.



conducting power. Most authors agree to this. These examinations were made valuable by comparison of the bone shortening with some examination in old people who had good hearing. (I omit tabulated results.)

RESUME. 1. The prevalent disease of the hearing apparatus in advanced life is the acusticus affection, which is mostly primary.

2. Among the primary affections, presbycusis is comparatively infrequent, about 25 per cent.

3. The diseases of the middle ear frequently involve the labyrinth, and in advanced life the labyrinth seldom remains intact.

4. Chronic middle-ear suppuration is very rare.

5. The shortening of bone conduction in a disease of the middle ear (Schwabach's test) is of use in diagnosis only when corroborated by the high-tone tests, or, when the shortening is a marked one (more than eight to nine seconds).

6. Senile shortening can be attributed neither to the hearing distance nor to the age, but is due in general to the common senile condition.

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